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Department of
Agriculture

Forest Service



International Institute
of Tropical Forestry

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June 2008



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Annual Letter 2003–2004: 100 Years of Tropical Forestry in Puerto Rico and the U.S. Virgin Islands



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Cover

Clockwise from the left:

The new tropical forestry building, January 1943.

The first field trip; c.1939, the person on the far right is Leslie Holdridge, the first research scientist at the Institute.

Dr. Frank H. Wadsworth, ITF Director from 1956 to 1978, inspecting a seedling, 1989.

A group of international foresters participating in the annual tropical forestry training at the then Institute of Tropical Forestry, 1963.

Annual Letter 2003–2004: 100 Years of Tropical Forestry in Puerto Rico and the U.S. Virgin Islands

U.S. Department of Agriculture
Forest Service
International Institute of Tropical Forestry
Jardín Botánico Sur
1201 Calle Ceiba
San Juan, Puerto Rico 00926-1119
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Introduction

In 2005, the U.S. Forest Service will celebrate its 100th year of caring for the land and serving the people. As part of a year-long celebration, regional congresses took place in 2004. One of these was the Tropical Forestry Centennial Congress. This Annual Letter focuses on the congress and other celebratory activities held at the International Institute of Tropical Forestry.

As part of this observance, a small group of Institute employees planned and executed the Tropical Forestry Centennial Congress. The congress included a half-day plenary where the Forest Service reported its activities in the tropics of the Caribbean, Central and South America, and Micronesia. Based on these half-day talks, interdisciplinary delegate groups were asked what they believed the Institute had done well and where it could improve, and to make recommendations for the future, and resolutions to the whole congress. The year's annual letter reports on the responses of congress and delegate groups. This information is not only helpful in future institute planning and management of tropical forests in the Caribbean, Central and South America, and Micronesia, but the lessons learned here might be applicable to other tropical regions the world over.

Tropical Forestry Congress

The Tropical Forestry Centennial Congress was an activity planned and executed by a small group of International Institute of Tropical Forestry and National Forest System employees and their collaborators. This group was assisted by others for a total of 32 employees and 27 non-Forest Service volunteers who staffed the congress.

The regional congress was one of nine other such congresses taking place throughout the Nation. In January 2005, a National Congress will take place in Washington, DC, with reports from each regional congress. The upcoming National Centennial Congress emulates a similar congress held 100 years ago, which led to the formation of the Forest Service as a new agency.

Institute, National Forest System, and Pacific Southwest Research Station employees were asked to submit nominations for delegates, as well as candidates for formal recognition of accomplishments in the areas of forestry and environmental issues, at the congress. There were five nominations for recognitions, and the planning committee selected three. We invited 209 people to be delegates out of which 93 attended. Invitations were made nontransferable (see sample letter). The composition of delegates reflected a wide spectrum of our clientele, collaborators, and professionals (table 1). Congress attendance by delegates who had confirmed was 87 percent on the first day and 80 percent on the second day. A week prior to the congress, delegates received a package of information that included a brief primer on tropical forestry.

The congress included a half-day plenary where the Forest Service reported its activities in the tropics of the Caribbean, Central and South America, and Micronesia. Talks were supplemented with 50 posters depicting programs in Hawaii, the National Forest System, and the institute. Delegates were assigned to five groups and were asked to react to the morning talks and the pregress material (what we have done well and what we have not done well), and to make recommendations for the future and resolutions to the whole congress (app. 3). Groups had a facilitator and note taker and elected a spokesperson for the following day's reports. The next day, each group reported on their work and presented resolutions to the assembly of delegates. Twelve resolutions were presented by the individual groups and voted on by all delegates (app. 4). Of these, seven received more than 75 percent of the vote and will be presented at the national congress in Washington, DC.

Because the institute was celebrating its 65th anniversary, the congress program included two additional activities: an open house of institute facilities and the

The congress included a half-day plenary where the Forest Service reported its activities in the tropics of the Caribbean, Central and South America, and Micronesia.

inauguration of a new Geographic Information System Remote Sensing Laboratory. Associate Chief Sally Collins cut the ribbon for the new laboratory.

Sally Collins presented Centennial plaques to Michael Buck, retired State Forester from Hawaii, María Falcón, a television producer in Puerto Rico, and the University of Puerto Rico for their contributions to tropical forestry leadership in Hawaii; producing a program on environmental issues and awareness on public television in Puerto Rico; and for their contributions, collaboration and support to institute sponsored research, respectively. She also closed the congress with concluding remarks. The congress ended with a lunch, and background music under guanacaste trees at the University of Puerto Rico's Botanical Gardens.

Table 1—Delegates to the Tropical Forestry Regional Centennial categorized according to employment, country, and type of organization

Category	Number
Employment:	
Non-Forest Service	50
Forest Service	43
Total	93
Country:	
Puerto Rico	76
Hawaii	3
United States (other than Hawaii)	10
Colombia	1
Venezuela	1
Argentina	2
Total	93
Organization:	
Commonwealth government	6
Federal government	44
Other governments	1
Academia	20
Environmental organizations	7
Professional/individuals ^a	15
Total	93

^a Includes high school teacher, biologists, physician, reporters, attorney, commonwealth senator, television producer, architect, meteorologist, city mayor, engineer, scientists, and environmentalists.

TROPICAL FORESTRY CONGRESS

...a centennial celebration

AGENDA

Day 1
Wednesday, August 25
Centro de Bellas Artes, Caguas

7:30-8:30	Registration	
8:30-8:35	Plenary session	<i>Pablo Cruz</i>
8:35-8:45	Welcome	<i>Hon. William Miranda Marín</i>
8:45-9:30	The Caribbean, Central, and South America	<i>Kathleen McGinley</i>
9:30-10:15	Hawaii and Micronesia	<i>Gorland Mason</i>
10:15-10:35	Break	
10:35-11:20	Puerto Rico and the U.S. Virgin Islands	<i>Blanca Ruiz</i>
11:20-12:00	Summary/Discussion	<i>Ariel E. Lugo</i>
12:00-1:30	Lunch*	
1:30-3:30	Group discussions*	<i>Facilitators</i>
3:30-3:50	Break*	
3:50-5:00	Groups prepare report for next day plenary*	<i>Facilitators</i>

*Delegates only

Day 2
Thursday, August 26
Jardín Botánico, Río Piedras

→ At the Institute...		
9:00-10:00	Open House Ribbon-cutting for new GIS laboratory	<i>Employees of IITF and Sally Collins</i>
→ At Las Guinecastos...		
10:15-10:30	Introduction	<i>Pablo Cruz</i>
10:30-12:00	Group presentations and discussion	<i>Group Representatives</i>
12:00-12:30	Award Ceremony	<i>Ariel E. Lugo and Sally Collins</i>
12:30-3:30	Lunch	

In collaboration with:



Sample Letter of Invitation to Delegates

Dear Mr. (Ms., Mrs.):

The Forest Service is celebrating one century of public service. Our Centennial is in July 2005. The agency has plans for many activities to commemorate this milestone. Your name has been suggested by a group of peers to participate as a delegate in an activity that is of particular importance to those of us that live in the tropics. The activity is a regional Congress on Tropical Forestry to be held in Caguas on August 25–26, 2004. If you accept our invitation, you will receive more information about the Congress at a later date.

The regional Congress is one of nine other such congresses taking place throughout the nation. In January 2005, a National Congress will take place in Washington DC with reports from each regional congress. The upcoming National Centennial Congress emulates a similar Congress held 100 years ago, which led to the formation of the Forest Service as a new agency.

The Puerto Rico regional congress will last for one and a half days and will consist of three sets of activities. First, Forest Service employees will present their vision for tropical forestry for the next century. Second, delegates will form discussion groups to provide their vision of tropical forestry. The idea is to use our historical experience and current condition to formulate suggestions for the future. What we want to know from you is: How can the Forest Service better serve the public in the tropics while caring for the land in the 21st century?

Third, a summary of the findings and recommendations of discussion groups will form part of the report for the National Centennial Congress and we will conclude the activity with an awards ceremony and an outdoor lunch at the Botanical Gardens in Río Piedras, Puerto Rico.

Delegates are expected to attend the activity in its entirety. As stated earlier, you were nominated by several sources; therefore the invitation is non-transferable so please contact Millie Alayón by email (malayon@fs.fed.us) or telephone 787-766-5335 x-224 to confirm your attendance by July 30, 2004. We hope you accept our invitation and honor us with your participation in this activity commemorating 100 years of Forest Service presence in the tropics.

Sincerely,

ARIEL E. LUGO

Director

Delegate Package and Tropical Forestry Primer

Dear Delegate:

Thank you for accepting our invitation to be a delegate to the Tropical Forestry Regional Centennial Congress, scheduled for August 25 at the Caguas Fine Arts Facility. The following information is intended to help you understand your role as a delegate. There will be about 100 fellow delegates from Puerto Rico, the US Virgin Islands, Hawaii, and mainland United States. The proceedings will be in English and Spanish, and translators will be available. A preliminary program is enclosed for your information. For your participation to be effective, we ask that you attend the whole activity, which ends at noon on August 26, 2004 at the Botanical Gardens in Río Piedras.

In January 1905, delegates from all over the United States met in Washington DC to consider the forestry situation of the United States. One of the 40 or so recommendations of that Congress was that the United States should organize a Forest Service as an independent agency of government. Months later (July 1905), the Forest Service was created within the Department of Agriculture. One hundred years later (2005), the Forest Service will conduct a National Centennial Congress in Washington DC, to report on the accomplishments of the last 100 years, assess how the Agency is performing, and seek public recommendations and direction for the future.

Prior to the January 2005 National Centennial Congress in Washington DC, the Forest Service is conducting Regional Centennial Congresses to gather information from as wide a spectrum of society as possible. Each Regional Centennial Congress will send three delegates to the National Centennial Congress and produce a summary statement that will be published in the proceedings of the National Centennial Congress.

Our Regional Centennial Congress focuses on Tropical Forestry. The Forest Service has contributed to tropical forestry throughout the tropical world, but its most visible activities have been in the tropical islands of the Pacific and the Caribbean. During the Regional Tropical Forestry Centennial Congress, you will receive a report of our accomplishments in the tropics and of our vision for the future. Our report will be in the form of oral presentations, publications, and posters. After our report, you will be assigned to a round table discussion group and asked to react to our report. What things are we doing well, and which ones we need to improve? Are there things we should stop doing? Are there things that we are not doing but should? What advice do you have for the direction that our program in tropical forestry should follow?

The Forest Service has contributed to tropical forestry throughout the tropical world, but its most visible activities have been in the tropical islands of the Pacific and the Caribbean.

We are taking advantage of this Regional Centennial Congress to also seek your opinion on the name of the Caribbean National Forest. At one time, this forest was known as the Luquillo National Forest, but the name was changed when the Forest Service was managing other districts in the Toro Negro region of Puerto Rico. The Toro Negro forest was exchanged with the Commonwealth and it is no longer part of the National Forest. Should the Caribbean National Forest remain with the current name or return to its original name as the Luquillo National Forest? Are there alternative names of this forest? What is your advice?

Each discussion group will have a facilitator and note-taker. We ask that you elect a spokesperson to present a 10-minute summary of your deliberations to the whole Congress the next day at the closing ceremony at the Botanical Gardens in Río Piedras. All group comments will be recorded, but we encourage group consensus on recommendations and even suggest resolutions that could be taken to the National Centennial Congress in Washington DC. We also welcome written statements that you wish to enter into the record of the Regional Centennial Congress.

To provide you with some background and an opportunity to think about your contribution to the Congress, we include four documents. First, is a brief primer on tropical forestry, so that you understand what the subject matter and critical issues are in general terms. Second is a document with the Vision, Mission, and Guiding Principles of the Forest Service. Third is an article by Roger Sedjo that summarizes the national mood regarding the cross roads at which the Forest Service finds itself as an agency. Finally, the fourth document is the recently developed Puerto Rico 2025 environmental vision summary, an excerpt from a full report prepared by the non-partisan, Puerto Rico's Steering Committee in consultation with more than 6,000 citizens. Together these four documents will help you organize your thoughts and give you some guidance for your deliberations. We welcome any issue you may want to raise in your group.

We are extremely excited about the outcome of this Tropical Forestry Regional Centennial Congress. It is the first time that such a gathering of our friends and collaborators meets to become directly involved in the desired direction of our programs. We thank you very much for your willingness to collaborate with this activity and look forward to talking to you on August 25.

Sincerely,

Ariel E. Lugo
Director

Enclosures (5).

The objective of tropical forestry is to provide for the needs of people while conserving the tropical ecosystems that provide the products and services that humans require.

A Brief Primer on Tropical Forestry

Tropical forestry deals with the conservation of tropical forests, including forest lands, waters, and all the biodiversity that they contain. The objective of tropical forestry is to provide for the needs of people while conserving the tropical ecosystems that provide the products and services that humans require.

Tropical forests represent about half of the world's forests (about 1.8 billion hectares), contain more than half of the world's biodiversity, and support over half of the world's human population. There are more types of tropical forests than temperate and boreal forests combined. The reason is that the tropics contain many climates from the frost-free lowlands to snow-covered mountains and from deserts to rain forests. The absence of frost in the lowlands is one of the main reasons why there are so many species of organisms in the tropics. Tropical organisms don't require defenses against cold.

Tropical forest lands experience the highest deforestation rates in the world, mostly because tropical people need land to grow food. Deforested lands are used for agricultural purposes, but large areas are degraded and abandoned. Secondary forests re-grow in some of the abandoned degraded lands. Today, the area of secondary forests in the tropics is as high as the area of mature tropical forest. However, the area of degraded deforested land is also increasing. Assuring sufficient high-quality water supply for human consumption, repairing degraded lands, and conserving the biodiversity of the tropical forest are three of the main challenges of tropical forestry.

Tropical foresters focus their activities on the protection of forests, reforesting lands, restoring forests on degraded sites, managing forests for products (fiber, meat, water) and services (clean water, clean air, recreation), conducting research, educating the public, and helping in the development of policies for sustainable land and resource management.

Managing tropical forests is complicated because tropical forests are complex and diverse and little is known about them. In Puerto Rico alone, there are as many tree species as there are in all of North America from Florida to Alaska. The high richness of species applies to all groups of organisms. In Hawaii, of the 10,000 native species, over 90 percent are endemic (found nowhere else in the world). To complicate matters, few scientists live in the tropics and most forestry research takes place in temperate and boreal regions. Therefore, the base of knowledge needed to support sustainable forest management in tropical countries is limited.

The Forest Service and its predecessor the Bureau of Forestry, has had a presence in the tropics for over 100 years in Puerto Rico and 50 years in Hawaii. The

Caribbean National Forest is the only tropical forest in the National Forest System. The International Institute of Tropical Forestry was established in 1939 to support the management of the national forest and restore forests to deforested lands in Puerto Rico. The Institute of Pacific Island Forestry was established in 1957 to support forest and water conservation efforts in Hawaii and U.S.-affiliated governments of the Pacific. Both research Institutes continue with the original mission but also deal with broad tropical resource management issues such as dealing with alien species or the global role of tropical forests.

The tropical forestry activities of the Forest Service in the Caribbean and the Pacific are relevant to tropical forests elsewhere in the world including the United States. The reasons are many but include the small size, long history of human activity, and the diversity of forests in the islands. Small size and diversity of forest allow for greater interaction among forests and between terrestrial and aquatic ecosystems. Ecological processes are easier to visualize and study. In addition, processes such as those associated with high human population are more intense per unit area of land. As an example, human population is from 10 to 100 times higher in the islands than in continents. The long history of human activity under these conditions allows for greater interaction between people and forests, and for observing the long-term outcome of processes such as deforestation, reforestation, alien species invasions, and sustainable forest management. Tropical island forests become laboratories for informing continental debates because islands and their forests are:

- harbingers of the future given the density of human activity and population they support;
- warning signs of change (biodiversity, global change, emerging new resource management issues);
- models for the management of complex natural ecosystems;
- connected to continents by many mechanisms including migratory species, international commerce (wood, coca, hamburgers, tourism), global phenomena, etc.;
- terminus of many environmental gradients, i.e., they are useful for comparative research.

In short, tropical islands are mesocosms of compact complexity, and tropical island forestry teaches many lessons that are applicable to continental areas. A partial list of tropical forestry issues that occupy the daily debate and concern among tropical foresters would include the following:

1. How do we deal with large-scale natural disturbances of tropical forests such as hurricanes, drought, and fires?
2. How do we deal with large-scale anthropogenic disturbances of tropical forests such as urbanization, fires, and unmanaged access to valuable resources?
3. How do we approach the dramatic changes in biodiversity due to the large-scale disturbances mentioned above? For example, the invasions of alien species, the endangerment of endemic and native species, and the high level of rare species.
4. How do we satisfy the increasing demand on tropical forests for products and services? For example, people need more food, fiber, high-quality water, open spaces for recreation and nature-based tourism, and ecosystem services such as buffering human activity.
5. Which research priorities should we focus on in the coming decades?
6. How should we interface with the public and which should be our outreach priorities?

Citation: Michael Buck

In 1950, the then-Territory of Hawaii, through its Department of Land and Natural Resources, invited the USDA Forest Service to establish a permanent presence in the islands. As stewards of more than 800,000 acres of public lands, they realized that they needed assistance in research and technical assistance. The result was the establishment, in 1957, of the Institute of Pacific Islands Forestry. The state-federal partnership has, from the start, been unusually close, with the state providing facilities as well as access to its forest resources.

In 1989 Michael Buck assumed leadership of the department's Division of Forestry and Wildlife. One of his acts was to literally remove from its hinges the door separating the state's Division and the federal Institute. He has been a partner in the most fundamental sense of the word: sharing, advising, encouraging, encouraging, and leading.

Michael was a strong force behind the Hawaii Tropical Forest Recovery Act of 1994, a piece of federal legislation that led to the most extensive public reforestation ever undertaken in the state. The positive consequences of the act and following activities are a legacy that guide forestry in all sectors in Hawaii.

His high-visibility post in Hawaii made him the friend or enemy of almost everyone in the state at one time or another, sometimes simultaneously. While never a seeker of the limelight, Michael never shrank from controversy either, always doing his best to ensure the fairest possible solution for all. He was a decisive, open-minded, action-oriented leader, one who served under several governors and their cabinet members. As he liked to put it to his staff: "There's the A team and the B team. We're the B team. We'll B here after the A team is gone."

Michael Buck's relationship with the Forest Service was, and remains, deep, both nationally and locally. He was a very active member of the National Association of State Foresters, ever eager to learn from what other states were doing and even more anxious to teach his colleagues about the special needs of his small, distant state in the Pacific. He was tapped by the Secretary of the Interior to be a member of the National Invasive Species Council, a post in which he served with distinction under Presidents of two political parties.

This narrative is written in the past tense not because Michael Buck is "gone" but because he retired from State of Hawaii employment on June 30 of this year at the ripe old age of 50. He will remain active in the national resource arena, on both the state and federal levels, to be sure. His commitment is profound. He always reminded his staff that, in any government post one has to decide whether they work for the King or the Kingdom. And when it came to natural resources, it was clear to all that Michael Buck worked for, and will continue to serve, the Kingdom.

Citation: Geoambiente del Caribe

Address: Calle Eleonor Roosevelt 13, Suite #4 Hato Rey PR 00918

Phones: 787-380-6815 cel./ 787-772-9647 office.

Beginning in 2001, Geoambiente, a one-hour weekly television series has been featured on WIPR-TV, the Puerto Rico PBS affiliate. This highly informative program takes up the challenge of advocating a need in today's society: to provide a source of locally focused environmental education to the Puerto Rican public.

Maria Falcon conceives, produces, directs, and writes scientifically accurate, pertinent episodes, which her talented Geoambiente crew package artfully, with beautiful music and visual effects. Its one-hour air-time gives Geoambiente the freedom to provide indepth coverage of each environmental education theme, and could become a catalyst for positive environmental change in Puerto Rico.

Geoambiente presents the Island's natural world to the local public; untold riches that they may have overlooked or not appreciated in the past. In this ongoing tour through the natural wonders of the island we learn of the environmental destruction we are causing by unplanned development; we learn how we might aspire to a more sustainable way of living by developing a better understanding of nature. To further augment the value of Geoambiente as an educational tool, Maria Falcon has published a guide for teachers and students, which is available on the Internet.

El Yunque, the Caribbean National Forest, has been featured prominently on various episodes of this series, with Forest Service scientists (most notably International Institute of Tropical Forestry Director Ariel Lugo), participating as experts. Geoambiente presents a fascinating public platform for understanding natural science.

Maria Falcon says that Geoambiente is currently thriving because of "Sacrifice and love of the product by her crew and herself." May she and Geoambiente continue to provide us with such a wonderful "product," one that is an extremely valuable and pertinent public service!

Written by Cynthia Manfred, Interpreter, Caribbean National Forest

Citation for the University of Puerto Rico— A Partner for the Ages

The University of Puerto Rico's (UPR) history goes back as far as that of the Forest Service and the International Institute of Tropical Forestry (Institute); in fact, they celebrated their 100th anniversary in 2003. They have been a long-time partner of the Forest Service through collaborative programs carried out by the Institute. Through the Institute's State and Private Forestry Program, the following projects, among others, have been carried out:

- a. **Caribbean Urban Forestry Conference:** the first urban forestry conference was held in Puerto Rico in 1995 through the collaboration of the UPR's Mayagüez Campus and the Institute. The intent of this conference was to create awareness and further academic interest in the resources of the island's urban forests. The conference has since become an annual event that has extended to include the U.S. Virgin Islands (where it was held this year), evolving from a local conference into one that embraces the Caribbean.
- b. **International Society of Arboriculture (ISA).** The Institute and the UPR, through its Agricultural Extension Service (AES) enabled the certification of the first group of professional arborists in the island. There is now an ISA Chapter in Puerto Rico and the U.S. Virgin Islands thanks to the initial efforts of the UPR and the Institute. Through the UPR's AES in tandem with the Institute, specialized workshops, conferences, and other educational resources have been developed to supply a need by professionals in this field. Among the workshops and initiatives offered are:
 1. Tree Academy—UPR Mayagüez Campus
 2. Taxonomy workshops
 3. Tree-climbing workshops
 4. Managing trees after a hurricane
 5. Establishment of an arboriculture course in UPR Cayey Campus
 6. Sustainable agriculture in UPR Utuado Campus
 7. Geographic information system workshops, and others.
- c. **Forest Stewardship:** the UPR has been a strong promoter of state and private forestry projects by establishing tree plantations that also function as catalysts for soil and water conservation on the island. Data produced by research carried out by the UPR and the Institute are made

available to all interested in an effort to promote sustainable conservation practices on private lands.

The UPR has also been a great supporter of our research programs. Through the years they have collaborated with us in a host of research projects. This year, for example, we have a canopy trimming experiment, research on ecology of Puerto Rican streams, and a mapping of Caribbean vegetation, among others. I believe the university is greatly deserving of a centennial award.

MAGALY FIGUEROA
State and Private Forestry
USDA Forest Service, IITF

What Is Tropical Forestry?

Ariel E. Lugo and Mildred Alayón
International Institute of Tropical Forestry
USDA Forest Service, Río Piedras, PR

Introduction

Tropical forestry deals with the conservation of tropical forests; including forest lands, waters, and all the biodiversity they contain. The objective of tropical forestry is to provide for the needs of people while conserving the tropical ecosystems that furnish the products and services that humanity requires.

Tropical forests represent about half of the world's forests (about 1.8 billion hectares), contain more than half of the world's biodiversity, and support over half of the world's human population. There are more types of tropical forests than temperate and boreal forests combined. The reason is that the tropics contain many climates: from frost-free lowlands to snow-covered mountains and from deserts to rain forests. The absence of frost in the lowlands is one of the main reasons for so many species of organisms in the tropics: tropical organisms don't require defenses against cold.

Tropical forest lands experience the highest deforestation rates in the world, mostly because land is needed to grow food. Deforested lands are used for agricultural purposes, but large areas are degraded and abandoned. Secondary forests regrow in some of the abandoned degraded lands. Today, the area of secondary forests in the tropics is as high as the area of mature tropical forests. However, the area of degraded deforested land is also increasing. Assuring sufficient high-quality water supply for human consumption, repairing degraded lands, sustaining the flow of forest products and services to people, and conserving the biodiversity of the tropical forests are some of the main challenges of tropical forestry.

Managing tropical forests is complicated because tropical forests are complex and diverse and little is known about them. In Puerto Rico alone, there are as many tree species as there are in all of North America from Florida to Alaska. The high richness of species applies to all groups of organisms. In Hawaii, of the 10,000 native species, over 90 percent are endemic (found nowhere else in the world). To complicate matters, few scientists live in the tropics, and most forestry research takes place in temperate and boreal regions. Therefore, the knowledge base needed to support sustainable forest management in tropical countries is limited.

Tropical forests represent about half of the world's forests (about 1.8 billion hectares), contain more than half of the world's biodiversity, and support over half of the world's human population.

The Forest Service in the Tropics

The Forest Service and its predecessor, the Bureau of Forestry, have had a presence in the tropics for over 100 years in Puerto Rico and 50 in Hawaii. The Caribbean National Forest (CNF) is the only tropical forest in the National Forest System. The International Institute of Tropical Forestry (the institute) was established in 1939 to support the management of the national forest and restore forests to deforested lands in Puerto Rico. The Institute of Pacific Island Forestry was established in 1957 to support forest and water conservation efforts in Hawaii and U.S.-affiliated governments of the Pacific. Both research institutes continue with the original mission but also address broad tropical resource management issues, such as dealing with alien species, or the global role of tropical forests.

Tropical forestry activities of the Forest Service in the Caribbean and the Pacific are relevant to tropical forests elsewhere in the world, including temperate forests in the United States. The reasons are many, but include the small size, long history of human activity, and the diversity of forests in the islands. Small size and diversity of forests allow for greater interaction among forests and between terrestrial and aquatic ecosystems; ecological processes are easier to visualize and study. In addition, processes such as those associated with large human populations are more intense per unit area of land. For example, human population in the islands is from 10 to 100 times that in continents. The long history of human activity under these conditions allow for greater interaction between people and forests, and for observing the long-term outcome of processes such as deforestation, reforestation, alien species invasions, and sustainable forest management. Tropical island forests become laboratories for informing continental debates because islands and their forests are:

- Harbingers of the future given the density of human activity and population they support.
- Warning signs of change (biodiversity, global change, emerging new resource management issues).
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- Connected to continents by many mechanisms including migratory species, international commerce (wood, coca, hamburgers, tourism), global phenomena, etc.
- The terminus of many environmental gradients, i.e., they are useful for comparative research.

In short, tropical islands are mesocosms of compact complexity, and tropical island forestry teaches many lessons applicable to continental areas. The Forest Service has been dealing with these conditions for decades, and thus, has been a major contributor to the understanding and management of tropical forests.

Tropical Forestry Issues

A partial list of tropical forestry issues that occupy debate and concern among tropical foresters would include the following:

- How do we deal with large-scale natural disturbances of tropical forests such as hurricanes, drought, and fires?
- How do we deal with large-scale anthropogenic disturbances of tropical forests such as urbanization, fires, and unmanaged access to valuable resources?
- How do we approach the dramatic changes in biodiversity product of the large-scale disturbances mentioned above? For example, the invasions of alien species, the endangerment of endemic and native species, and the high level of rare species.
- How do we satisfy increasing demand on tropical forests for products and services? For example, people need more food, fiber, high-quality water, open spaces for recreation and nature-based tourism, and ecosystem services serving as a buffer to human activity.
- Which research priorities should we focus on in the coming decades?
- How should we interface with the public and which should be our outreach priorities?
- What level of attention should urban forestry, land management, and forest restoration command in our future programs?

The Tropical Forestry Centennial Congress

The Tropical Forestry Centennial Congress was an activity planned and executed by a small group of institute and forest employees and their collaborators. Institute, CNF, and Pacific Southwest Research Station employees were asked for nominations of delegates and candidates for formal recognition at the congress. Sally Collins presented centennial plaques to Michael Buck, retired State Forester from Hawaii, María Falcón, a television producer in Puerto Rico, and the University of Puerto Rico. The composition of delegates reflected a wide spectrum of our clientele, collaborators, and professionals.

The congress included a morning plenary where the Forest Service reported its activities in the tropics of the Caribbean, Central and South America, and Micronesia. Talks were supplemented with 50 posters depicting programs in Hawaii, the CNF, and the institute. All these materials are available as a CD ROM through the institute.

Delegates were assigned to interdisciplinary groups (Ausubo, Ceiba, Guayacán, Laurel Sabino, Tabonuco) and were asked to react to the morning talks and the pregress material (what we have done well and where we need to improve), to make recommendations for the future, and resolutions to the whole congress. One group, Guayacán, did not turn in a report. What follows are observations and recommendations of four groups.

Ausubo

Some delegates stated that the morning presentations were appropriate in responding to questions about the history of the Forest Service. A few stated that the agency's original mission had been more science-based but that it was now focusing more on recreation. General consensus was reached on the need for reforestation in the tropics as tropical forests are being rapidly depleted at a global scale. In Puerto Rico, for example, urban development is becoming a problem. The Forest Service needs to promote the rescue and conservation of tropical forests and open more marketing opportunities for its products. There is a general trend of involving business as stakeholders in the conservation of tropical forests, but delegates felt that the Forest Service didn't know how to synchronize these efforts with companies to achieve a plan of forest preservation.

With respect to the institute, delegates felt there was good access to research: scientific access through the library and chemistry laboratory as well as availability of maps in both languages through the geographic information system lab. Several research programs, such as those in tropical forests, are excellent. The institute's role in the international arena was viewed as a positive effort. Also good are the educational programs that will foster the creation of future scientists and the conservation of forest resources. Although some felt that there should be more research conducted in sites other than the CNF, others felt research should focus more on management practices in the CNF.

Notwithstanding the above, some delegates felt that there was lack of communication between the general public and the institute in that the public does not receive information about research results. They felt that most of the research stays

with and among researchers and the public is not informed. Research results should be simplified so the public understands its importance.

Regarding the forest, the general consensus in this group appeared to be strong on disallowing military activities in the CNF. Some felt the Forest Service was not promoting management and that it should to preserve the CNF in Puerto Rico.

Whereas some delegates felt that there was not enough educational and community outreach, particularly with neighbors to the CNF, others felt that the Forest Service was working with communities and teaching them the importance of preserving natural resources and tropical forests. More access for the physically challenged was presented as a required improvement, as well as clearing access for hikers.

Delegates saw as positive action by the Forest Service its efforts at land management, environmental education programs through programs for teachers at El Portal, and the protection and preservation of natural ecosystems, such as watersheds. They also agreed that recreation facilities, infrastructure access, interpretation at the CNF, and the Seniors Program were areas where the Forest Service was on the right track at CNF. Some encouraged purchasing land around the CNF and many delegates felt that no one was better at managing the Caribbean National Forest than the Forest Service.

Ceiba

Delegates began by indicating that the Forest Service should be moving on to the next level in research. Research should integrate land managers and the community. Public demands should not be ignored. More training on cultural diversity and on communication within cultural differences should be enhanced so that the Forest Service can present a more positive image to people of other countries. The Forest Service needs to be more proactive in many areas. It needs greater interaction with the community, improved communication across language barriers, and should encourage citizen participation in the processes. In terms of the institute library, access needs to be improved island-wide by opening the library electronically for potential users that would otherwise not have access to its services.

The Forest Service needs to improve the role of Private Forestry. Continued research is needed on the impact of fire on ecosystems and integration between national,¹ state, and private forestry in dealing with this threat. Cooperative

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¹ By “national” the group is referring to those forests owned by the federal government, as in Caribbean National Forest.

forestry promotes private forestry through landowner grants; however, national forests appear to play a larger role in these grants. More work is needed in the development of forest management plans by seeking greater participation from managers, the public, and academia. In the administration of these forests and its human resources, the Forest Service should keep striving toward a diverse workforce. In the area of recreation, the Forest Service could improve on quantity and quality.

The group expressed that the Forest Service should formulate methods of producing financing for the protection of the environment. It needs to be more proactive. How much wood is used worldwide? National forests used to provide for this resource, yet now, they produce less than 5 percent. The Forest Service should be looking into providing for more in this area as a means of economic self-sustenance. More research should be geared toward addressing what is needed to provide for wood extraction. The Forest Service needs to expand collaboration on tropical forests with other nations at an international scale.

In the local arena, the Forest Service should prioritize extending the northeast ecological corridor to the coast, thus opening up greater opportunities to expand knowledge of services provided by the environment. More efforts need to be expended on the protection of native species pursuing research that will allow us all to better understand them. To improve on the management of the CNF, the Forest Service should increase training on forest land management and research, create plantations for rare and exotic plants, provide more interpretive programs for visitors, increase its water management program, and buy more land. In addition, research should address conservation management.

The Forest Service should not limit its research to the CNF but also could study what is outside of the CNF. Why not study other forest types? How can damage to these resources be prevented? The Forest Service should also recognize that there is a worldwide shift toward recreation as a result of the growth in population; however, managers need to limit uses within these lands to ensure its sustainability. They should be more aware of this shift in focus and provide for protection by controlling access. To do this, tough laws are needed and people to enforce them. People should be taught to take care of the land. The country needs to work harder at seeing the environment and its products as something of value. How do we manage both population growth and land preservation? Educate the people. Greater efforts toward public outreach should be pursued so that the public can be informed regarding what is being done by the Forest Service. There is great public interest and the public wants to be informed.

Educate the people. Greater efforts toward public outreach should be pursued so that the public can be informed regarding what is being done by the Forest Service.

The Forest Service should stop projecting itself as the “know-it-all” agency. There is an image problem at the core of this agency’s delivery. Instead of dictating, a better approach would be one of working together. Rather than ignoring situations experienced by other countries, learn from them. Don’t be afraid to sever ties. The Forest Service should challenge local government, and at some point, work toward stopping development on some lands. Stop experimentation that would be detrimental to the CNF or the environment.

As far as things that the Forest Service should continue, scientific research in tropical forestry has been doing a good job in preparing teachers and leaders worldwide. What was once long-term forestry is now long-term research and this focus has been successful. The level of research has risen and productivity can be seen in its publications. The information available as a product of this research is very accessible and helpful through the Internet and through consultation with dependable experts. The library is a valuable resource, and free access to the expertise it provides is available.

The Forest Service is protecting our natural resources and this can be increased by adding land. Safety at the CNF is excellent, and this could only have been achieved through improved forest management. The Forest Service has also excelled at helping other countries such as the Dominican Republic, Jamaica, and Costa Rica for example, not only in emergency responses, but also in land management strategies.

The Forest Service provides an independent voice that helps with decisions and is not afraid of saying things publicly. This voice is not just an opinion but also a credible source recognized for its good work. The Forest Service in Puerto Rico has hired many locals, respecting cultural differences and diversity in the workforce. By doing this, it has provided a workforce with staying power that has been exposed to long-term issues with a cultural advantage that aids in communication and makes it unique. In general terms, the Forest Service in Puerto Rico has done well—with room for improvement—in four areas: education, collaboration, research, and management.

Laurel Sabino

Delegates felt that the Forest Service is known in Puerto Rico for the quality of its research and its relevance to tropical forest management. Research has been conducted in a wide range of areas, and the Institute’s products are the technical and scientific publications that reach the public. Recognition of the Forest Service’s

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research program in Puerto Rico is international in scope, particularly in the tropics. Although there is room for improvement, the Institute's library is a resource for local undergraduate and graduate students. The Institute is a center for technical training for the islands of the Caribbean and Latin America.

Again, although with room for improvement, based on surveys, passive recreation in harmony with natural resources is enjoyed in the CNF. The CNF has a management plan, and, as public policy, all CNF activities are analyzed and put in practice based on this plan. However, there is room for improvement in some areas—for example, the parrot aviary needs better facilities. In addition, the forest plan is not easy to read, nor clear in its definition of terms. Given land use around the periphery of the CNF, it seems there is no buffer zone. The Forest Service needs to be more aggressive in preventing development in this zone and look toward seeing that the special zoning law is enforced.

The delegates noted philosophical differences between the CNF and the Institute. Access to the Director and Forest Supervisor is very good. They are open to the media and are honest in their responses. Although communication with the media by both units is very good, that does not always appear to be the case with communication with each other.

Interests between federal and state laws clash fostering a feeling of being in a “no man's island.” Forest Service policy at the national level conflicts with policy in Puerto Rico. Many in the group felt it important to note that the Forest Service does not seem to realize that the CNF belongs to the people of Puerto Rico. The CNF is well managed but could improve: more land should be acquired, proposals need to be developed, and continued interaction with CNF communities must be pursued. The Seniors Program, which provides education and training, could be improved in the area of providing tour guides and in preparing the enrollees for this task.

The Forest Service needs to review its internal processes at the CNF. Whereas on the one hand, the permit request process is highly bureaucratic and difficult, on the other hand, some in the group believe that research permits are granted for an excessive period. They should be evaluated on a yearly basis, and special use permits should go through a consultation procedure.

The CNF either needs to have better trained management personnel or perhaps hire more people. Law enforcement is so minimal it doesn't appear to exist. The western side of the CNF requires attention and the CNF in general could be improved by an increase in signs and better hiking roads.

There is a need for an interpreter to serve as intermediary in the “translation” of research to the public, some kind of liaison between scientific personnel and their products and the community. In addition, research focus should address other areas such as timber and wood usage, ethnobotany, native species, and nonwood product use. Although research in Puerto Rico is addressing a wide range of technical fields, there are additional areas that should be pursued: more study should be devoted to inventory and its use, secondary forests, and restoration. The Forest Service should ensure that research done is relevant to management problems not only for the CNF but also for Puerto Rico’s state forests and tropical forests in general. In addition, continued support for the Institute’s work in Brazil was recommended.

Although some delegates voiced concern over what they considered poor management and recovery of threatened and endangered species, as well as endemic species, others proposed that the standing policy against exotic fauna be modified to allow planned introduction of terrestrial and arboreal nonvolant land mammals that would replace extinct native species. They felt this could contribute to restoring the CNF original ecosystem.

In general terms, other areas of improvement voiced by some delegates included public relations, environmental education to low-income communities, better representation of Puerto Rican and Latin American scientists at the Institute, and opportunities for professional development for employees in Puerto Rico as opposed to mainland United States.

Tabonuco

In terms of human resources, delegates felt that the Forest Service has been a trainer of tropical foresters at an international scale. It has provided postdisaster assistance to tropical countries, supported sustainable tourism as an economic resource, been at the forefront in multicultural efforts, and, in Puerto Rico, kept a cultural tradition of hospitality and service to visitors.

Highlights in forest management include island reforestation, monitoring and inventory, contributing to the improvement of forest practices, and reducing impact of logging. Conservation efforts by the Forest Service have fostered an open door to tropical forest conservation. The Forest Service created the conservation icon of the Puerto Rican parrot as a reminder of how conservation efforts can rescue an endangered species.

The Forest Service should, however, improve on sustainable practices to reflect the integration of environmental, social, and economic factors and benefits.

The Forest Service conducts a significant amount of research in Puerto Rico and around the world. Research on threatened and endangered species and the implementation of this research has an impact, as witnessed by the previously mentioned rescue of the Puerto Rican parrot. Research conducted by Forest Service scientists on the island is adapted to meet local natural resource goals. Statistics and data are collected by Forest Service personnel and specialists, and technical publications are made available worldwide, thereby establishing what external users and environmental advocates see as evidence of the Forest Service's credibility.

The Forest Service should, however, improve on sustainable practices to reflect the integration of environmental, social, and economic factors and benefits. It needs to improve or increase the "human dimension" of its research to incorporate social concerns and issues. More resources need to be devoted to forest inventory and monitoring at an international scale. The Forest Service also needs to increase its efforts and successes in tropical forestry research in an effort to deal with natural forest management and fast-growing plantations in large-scale logging.

Internal communications between the different programs needs improvement. Research should be used to contribute to the development of an interdisciplinary approach and to integrate all the sciences. The Forest Service needs to improve at monitoring and documenting the impacts and benefits received by communities. It needs greater self-criticism of its scientific approaches and more emphasis on the study of the links between human health and ecosystem health. It needs to understand the connection between human health and biodiversity and not discard traditional ecological knowledge of indigenous peoples. More communication between tropical forestry regions is needed, and an international tropical forestry policy should be developed. The Forest Service needs to understand its markets and audience.

Specific recommendations include committing to long-term assistance to the Tapajos project (National Forest in Brazil), increasing relevant research on invasive species, committing to long-term technical assistance in Central America, and committing to improving inventory and monitoring data from stands to landscapes in the Caribbean region.

Resolutions of the Tropical Forestry Regional Congress

Twelve resolutions were presented by the individual groups and voted on by all delegates. Of these, the following five received more than 75 percent of the vote.

In addition to continuing to pursue its mission in the tropics, the USDA Forest Service should:

- Incorporate human dimensions and social concern aspects into its research program.
- Increase technical assistance and training in tropical countries.
- Improve visibility with internal and external customers.
- Support and enhance efforts directed at the conservation of the karst region of Puerto Rico.
- Increase collaboration between the Institute of Pacific Island Forestry and the International Institute of Tropical Forestry.

A New Name for the National Forest

Delegates also considered changing the name of the Caribbean National Forest.

Although the majority suggested a name change, there was no consensus on what the new name should be. Suggestions given were El Yunque National Forest, El Yunque Caribbean National Forest, Luquillo National Forest, El Yunque National Forest of Puerto Rico, Bosque Caribeño, Yuquiyú National Forest, Yuke National Forest, and Sierra de Luquillo National Forest.

USDA Forest Service in Latin America and the Caribbean

Kathleen McGinley
USDA Forest Service
International Institute of Tropical Forestry

Overview

The purpose of this presentation is to provide an overview of USDA Forest Service (FS) work and collaboration in generating and communicating knowledge critical to sustaining tropical ecosystems and their benefits in Latin America and the Caribbean. Land management, research, conservation of biological diversity, education, and outreach have been an integral part of FS programs and activities in the region over the past 100 years.

The FS began working in the forest reserves of Puerto Rico after the Spanish-American War in 1898. Other work and interest in international forestry led to the first global forest assessment produced by FS researcher Raphael Zon in the early 1920s, which included the first quantitative estimate of tropical forest area. The 1932 McSweeney-McNary Act of Congress designated a nationwide system of forest experiment stations, including one in the West Indies, and in 1939, the Tropical Forest Experiment Station was established in Río Piedras, Puerto Rico. This was later designated the Institute of Tropical Forestry, and in 1992, the mission of the Institute was again expanded to include International Cooperation and State and Private Forestry programs.

Through the years, FS land management, research and outreach programs in the American tropics have evolved in focus—early emphasis was on plantation forestry, species identification, and timber production. As modern societies have become more complex and both local and international populations recognize more and more the value of tropical forests for resources other than just wood, today's research, conservation, collaboration, and technical assistance programs reflect the need for information on forest systems, their roles as watersheds, and their conservation of biodiversity and environmental services.

As we look to the future, nowhere are forestry's challenges greater than in the tropics. The push to protect the diversity of resources and environmental services provided by tropical forest systems must not overshadow the social and economic values that local people place on these same ecosystems. We must search for new ideas, practices, and policies that better integrate stakeholders' physical, economic,

Today's research, conservation, collaboration, and technical assistance programs reflect the need for information on forest systems, their roles as watersheds, and their conservation of biodiversity and environmental services.

and spiritual needs, without compromising the ecosystems that provide these benefits. In response, the FS will continue to pursue new knowledge and develop practical tools through collaborative research, partnerships, extension, and conservation education as we try to better understand forests within a landscape dynamic, their functions as ecosystems, new forest types that result from changes in our environment, and how to manage and protect tropical ecosystem benefits for current populations and generations to come.

Introduction

It may be said that Forest Service involvement in foreign forestry began after the Spanish American War of 1898. The Luquillo forest reserve was established in Puerto Rico in 1903, the Philippine Bureau of forestry was organized by a U.S. army captain in the early 1900s, and the Forest Products Laboratory in Madison, Wisconsin, began tropical wood research in 1910—each serving to set the foundation for long-term U.S. involvement in tropical forestry (West 1991).

Experiment Station Established in Puerto Rico

In 1928, the McSweeney–McNary Forest Research Act authorized establishment of a forest experiment station in the tropical possessions of the United States in the West Indies. This led to the establishment of the Tropical Forest Experiment Station in Rio Piedras, Puerto Rico, in 1939. The original mission of the station focused on five main areas of research: forest management, forest economics, forest products, forest influences, and forest botany. The original charter also provided for the Station to “serve as a center for forestry education” and to “serve as an international center for tropical forestry research” that included directives to “afford research facilities to visiting foresters; function as a clearinghouse for tropical forestry information; [...and] determine regional forestry problems by international travel and site visits” (Upson 1950).

The early years of the experiment station in Puerto Rico included international activities that involved site visits meant to achieve solidarity with neighboring islands and mainland countries as well as a better understanding of their forestry issues. Then-Director Arthur Bevan, 1939–1943, reported that “due to current world conditions and the need for hemisphere solidarity, every opportunity was taken to meet with officials, to survey forest conditions and problems in other countries and to learn from others’ experiences.” During 1940, visits were made to eight Caribbean islands and the Canal Zone, and visitors were received from Venezuela and Colombia (Bevan 1940).

Forest types and socioeconomic conditions throughout Latin America and the Caribbean were described through these site visits and from information gleaned from visiting scientists, thus breaking ground for the foundation of knowledge necessary to develop management and conservation strategies for tropical forests in the region. In the 1940 experiment station annual letter, it was recommended that research be carried out “in every division” in order to cover the wide field of tropical forestry issues at the time:

forest management to protect and save existing stands and to reestablish accessible stands which have been destroyed, **forest influences** to assist water conservation for irrigation, to prevent silting and for flood control, **forest products** to determine the use and value of tropical woods growing in the western hemisphere, **forest economics** to survey and determine the forest resources of the tropics to determine requirements for wood products in local and foreign markets and to study the socio-economic problems on/ around forest lands; and **forest botany** to better understand succession, soil restoration, species-site relationships and provide for tree identification.

Even in those early years, focus was also placed on technology transfer and cooperation within the region, in addition to the local agenda. Arthur Bevan fostered an alliance with the British Forest Agency in Trinidad and established a long-term relationship of collaboration and exchange (Steen 1998). To promote shared experiences and knowledge on forestry in the region, station scientist Leslie Holdridge led an effort to produce a quarterly journal on the subject. In 1941, the first Caribbean Forester was produced with support from the government of Trinidad. The journal was “devoted to the encouragement of improved management of the forest resources of the Caribbean region by keeping students of forestry and allied sciences in touch with the specific problems faced, the policies in effect, and the work being done towards this end throughout the region” (Upson 1950 in Caribbean Forester). Focus was placed on reports from the Caribbean Basin, but information and exchange from around the world was encouraged and accepted. Articles often covered experiences with tropical plantation forestry in the Caribbean Basin, descriptions of tropical forest types, and identification of tropical species, as well as observations and reflections on the related social and economic issues throughout the region. The *Caribbean Forester* was published from 1939 to 1964 in 24 quarterly volumes in English and Spanish and was distributed to over 2,000 collaborators throughout the tropics and around the world (Weaver 1997).

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World War II and Increased Involvement in the Tropics

With the onset of World War II, and the eventual entry of the United States, the scene was set for increased involvement by the United States in international forestry practices and issues. Studies were carried out in tropical forests in search of sources of malaria treatments, wood products, and nontimber forest resources (West 1991). In 1943, Bevan went to Costa Rica to establish studies on oak species for wartime containers and whiskey barrels. That same year, then-Luquillo Forest Supervisor Evan Hadley went to the Amazon to work with rubber trees (Steen 1998).

As the war was coming to an end, international cooperation saw a rapid increase. The United Nations (UN) was created in 1945, in an effort to avoid repetition of World War II. That same year, Franklin Delano Roosevelt convened a multinational conference to consider ways to organize international cooperation on agriculture. This led to the establishment of the Food and Agriculture Organization (FAO) in October 1945. The FAO was actually the first international organization established after the Second World War, and in 1946 the organization reached an agreement with the UN to take part as a specialized agency under the UN system.

The initial agenda of the FAO focused on increasing levels of nutrition and standards of living for populations in need under the jurisdiction of the respective member countries. Its original mission excluded forestry-related issues until the Forest Service (FS) facilitated their inclusion in the first FAO conference in 1945. Up to that time, foresters had been struggling for decades to persuade developmental agencies that forestry was a critical element in land use planning, yet most agencies were concerned only with feeding the world's growing population. The FS continued to promote forestry wherever a forum could be found and accomplished a great feat in incorporating it into early FAO policy.

In 1946, the first meeting of the Forestry Subcommittee of the Committee on Agriculture, Nutrition, Fisheries and Forestry of the Caribbean Commission was held in Trinidad. The group shared experiences and analyzed forestry issues of the region, focusing on plantation forestry and tropical wood products. It was recognized there that the Tropical Forest Experiment Station was well suited to carry out the research functions visualized by the conferees, but it was also conceded that until the Station was better financed, local forestry issues would continue to absorb the limited funds and resources of the station.

In 1950, President Truman announced his support for bilateral technical assistance to newly independent countries and other developing nations. As a result, the FS was called upon to provide help in recruiting foresters and technical leaders for

overseas assignments and to receive foreign nationals for academic studies or on-the-job training in forestry and related areas (West 1991). With increased contact and collaboration with tropical countries, the importance of not only research but technology transfer became evident to many scientists at the Tropical Forest Experiment Station (Steen 1998).

In the 1950s, focus on international forestry grew considerably. As the FAO became a key supporter of improved agricultural and forestry practices around the world, regional forestry commissions were established, and natural resource related agencies began to spring up throughout the tropics, e.g., International Center for Research in Agroforestry (ICRAF), Inter-American Institute for Cooperation on Agriculture (IICA), Centro Agronómico Tropical de Instrucción y Enseñanza (CATIE). The Tropical Forest Experiment Station served numerous requests from Washington to represent the United States in conferences and meetings focused on tropical forestry issues. The Station also began to carry out training for students from throughout the tropics, who in turn created requests for technical assistance upon return to their home countries. Station scientists were also instrumental in the development of on-the-ground training and education programs in the tropics—examples include Frank Wadsworth's involvement in setting up a graduate training program in silviculture at the University of the Andes in Chile (Steen 1998).

As focus on international forestry increased, a need for training of tropical foresters was recognized and promoted. Given the established work of the FS in Puerto Rico, the island was considered an ideal location for training professionals from the Caribbean Basin. Additionally, as FS attendance at international meetings steadily rose, Station scientists began to see how research and results from Puerto Rico could be adapted and extrapolated to conditions throughout the region (Steen 1998). Site selection was not only based on the presence of the Tropical Forest Experiment Station. There were many identifiable similarities between Puerto Rico and many countries in the region: diversity of ecosystems and land formations, a wide range of forestry issues and historical uses, but perhaps most important was Puerto Rico's comparably advanced states of deforestation and agricultural and urban expansion that served as windows into the future for many less developed or deforested countries in the region, which were unmistakably moving down a similar path. Training programs at the Station covered topics such as tree identification, site selection, forest nurseries, planting, cutting methods, mensuration, aerial photometry, research methods, timber grading and classification, forest legislation, and forest administration (Dominguez 2000).

From 1953 to 1983, the Institute held 20 bilingual international forestry short courses with some of the attendees later being promoted to leadership positions within their respective governments. Between 1962 and 1963, eight formal 3-month programs of graduate study in tropical forestry and silviculture were attended by 30 students from across the United States. From 1975 to the present, periodic training and development programs for Peace Corps volunteers were also offered at the Institute and throughout the Caribbean Basin (Weaver 1997).

Increased Duties for the Institute of Tropical Forestry

In 1961, the Station was renamed the Institute of Tropical Forestry and given expanded duties to focus even more on forestry issues relevant to the tropics. The expansion of the mission was complemented by basic forest research being carried out in Colombia, Peru, Brazil, and Chile. This research was the result of U.S. Public Law 480, which provided grants to outstanding scientists around the world, many of whom had participated in training programs at the experiment station in Puerto Rico (Wadsworth 1961).

Over the next two decades, the FS continued to carry out research and training in the Caribbean Basin and throughout the American tropics. The Institute increased activities and collaboration throughout the region, leading to improved knowledge and experience with plantation forestry, tropical forest products, tropical species taxonomical descriptions, and long-term monitoring of natural and planted forests.

Public Interest Grows in Tropical Forestry Issues

As the information age came into force in the 1980s, publicity on the impacts of tropical deforestation increased, as did public interest in international forestry. Then-Forest Service Chief R. Max Peterson acknowledged our increasing need for involvement in forestry problems beyond our own domestic programs. This recognition of the importance of international forestry issues resulted in an upsurge of related research and publications and the establishment of a Forestry Support Program within the FS in direct relation to the U.S. Agency for International Development (USAID), as well as a special joint initiative between USAID and the U.S. Peace Corps (West 1991).

With increased interest in international forestry in the early 1980s, the U.S. International Communications Agency (ICA) undertook efforts to better inform policymakers, constituents, and the general public through a series of talks on tropical forest conservation. The ICA invited Dr. Frank Wadsworth to lead these discussions, which placed a special emphasis on the conservation of the Panama Canal

Zone. The important role that tropical forests play at a global level was also supported by Institute research. Permanent sampling plots that were originally established for timber production became useful for long-term ecological studies on forest structure, species composition, growth dynamics, water yields, and more. A result of this focused research was the description of tropical forests' role in the carbon cycle and their storage and production of organic matter (Brown and Lugo 1982).

As greater emphasis was placed on the sustainability of natural tropical forest management, the Institute continued to function as a center for technical training, providing courses in tropical forest management, with special programs developed for training Peace Corps volunteers to be stationed throughout the Caribbean Basin (Steen 1998). The Caribbean Foresters Meetings (CFMs) were also started during the early 1980s and continue to be held today. Since May 1982, these meetings have assembled leaders in the forestry and natural resource sectors and provide an opportunity for the exchange and dissemination of information. Throughout 22 years and 12 meetings of Caribbean foresters, many of the most significant and timely issues pertaining to natural resource management have been brought to light, studied, debated, and acted upon. From watershed management to forest recreation to biodiversity protection to fire management, the CFM have provided an opportunity for forestry leaders and topic specialists to share practical experiences and discover ways in which forest use can become more sustainable. As a result of this interaction and sharing, CFMs continue to advance the ways and means for reaching greater overall conservation of the forests and natural resources within the region (McGinley 2004).

The International Forestry Cooperation Act and the Designation of the International Institute of Tropical Forestry

In 1990, the 101st U.S. Congress passed legislation that greatly expanded the role of the FS in international resource management—the Global Climate Change Prevention Act and the International Forestry Cooperation Act (IFCA). The IFCA authorizes the Secretary of Agriculture to provide assistance that promotes sustainable development and global environmental stability in support of forestry outside the United States. The act directs the secretary to focus on key countries that could have a substantial impact on greenhouse gas emissions and to address tropical deforestation and degradation in support of the FAO Tropical Forest Action Plans. In addition to developments at the Pacific Island Institute of Forestry, the IFCA

provided for expansion of the Institute's mission in Puerto Rico to include funded programs in State and Private Forestry and International Cooperation, resulting in a new designation as the International Institute of Tropical Forestry. The amplified mission of the Institute further promoted the philosophy of collaboration and mutual learning that had guided the Forest Service for more than 75 years in the international arena and continues to do so today.

Within this expanded scope in the international arena, the Institute has increased cooperation and technical assistance with USAID missions throughout Latin America and the Caribbean. Continually, since 1989, the Institute has had staff members placed on long-term assignments in Central America within USAID missions as mission and regional environmental advisors. In addition, the Institute has provided the home-base for the USAID regional environmental advisor for the Caribbean since 1987, and short-term technical assistance to USAID missions has greatly increased. Following are some of the major results of these assignments.

- Collaboration with the Panamanian Government and local Nongovernment Organizations (NGOs) in the development of improved land-use practices and information resources on the historical, cultural, and natural resources of the San Lorenzo Protected Area located at the northwest entrance to the Panama Canal. This protected area forms part of the Mesoamerican Corridor of protected areas that extend from the Yucatan Peninsula of Mexico to the Panama-Colombia border. The collaborative work and research has led to improved resource management and long-term commitment to the conservation of this important area.
- In the aftermath of Hurricane Georges that struck the island of Hispaniola in September 1998, the FS carried out the coordination and management of a major component of the USAID Hurricane Georges Reconstruction Program in the Dominican Republic. The component was designed to provide technical assistance, equipment, and materials for forest land recuperation and improved land management, planning, and protection.
- Institute staff have also worked very closely with the Nicaraguan Environmental Authority in the development of promotional and interpretive materials for seven national parks that cover over 1 million hectares. This collaboration contributes to the conservation of a diversity of ecosystems and the education of national and international visitors on the importance of Nicaragua's natural resources.

The FS has also carried out long-term collaborative work in Brazil. In the Amazon, indigenous groups subsist and depend on the Amazonian forests threatened by expanding urbanization, agriculture, and pollution, while agriculture, fire, and logging conversions have caused rapid deforestation. Consequently, Brazil's environmental problems have alarmed global audiences with a diversity of competing interests. Continuing deforestation of one of the world's largest carbon sinks has consequences: higher emission of greenhouse gases in the atmosphere, extinction of numerous flora and fauna, and destruction of ecologically important areas such as the Pantanal. Since the early 1990s, the FS has extended cooperative research with Amazonian stakeholders (e.g., Brazilian Institute for the Environment, the Brazilian Space Agency, and the Tropical Forest Foundation [TFF]).

Collaboration between the FS and the TFF focuses on developing sustainable forestry practices and training forest technicians, managers, and supervisors in the application of forest management principles and reduced-impact logging methods in the Brazilian Amazon. Today, many of the forest managers and technicians working the Amazon Basin have been trained through the Forest Service/TFF program. Future efforts are focused on the establishment of a permanent forestry training center in the Amazon.

Another important partnership in the Amazon is the Brazilian-led Large-Scale Atmosphere Biosphere project of which the Brazilian Ministry for the Environment, the FS, and National Aeronautics and Space Administration (NASA) are major collaborators. The FS led component monitors and evaluates the disruption and recovery of nutrient cycles in response to forest clearing and different scales of timber harvesting. Along with studies of carbon and nutrients, the study of trace gas exchange, which establishes the links between the forest ecosystem and the chemical composition of the atmosphere, is taking place. Initial trace gas measurements indicate that logged forest produces significantly more greenhouse gases than undisturbed forests.

However, when these emissions are extrapolated to a wider area, the effects of harvesting on trace gases, also known as the Global Warming Potential, are far smaller than the effects from the carbon loss.

More evidence of the Forest Service's long history and positive impacts in the region includes long-term research and monitoring of mahogany (*Swietenia* spp.) that has provided significant contributions to the international debate on mahogany's conservation status, as well as developments on technical guidelines for mahogany's sustainable management. Other long-term monitoring and collaborative research on wildlife populations in the Caribbean Basin has shown noted

More evidence of the Forest Service's long history and positive impacts in the region includes long-term research and monitoring of mahogany (*Swietenia* spp.) that has provided significant contributions to the international debate on mahogany's conservation status, as well as developments on technical guidelines for mahogany's sustainable management.

declines in many Neotropical migratory species over the last quarter century. Continued monitoring will provide valuable comparative data for questions relating to human impacts on forests and wildlife, as well as possible changes in the global climate. In addition to monitoring carried out by Institute scientists, the FS has provided extensive training on long-term vegetation and wildlife monitoring to countries in the Caribbean Basin and beyond.

The Future of the Forest Service in the Caribbean Basin and the American Tropics

These new forests arise naturally on abandoned and often degraded agriculture lands, conditions that are found throughout the tropics and that exhibit both positive and negative traits (Lugo and Helmer 2004).

How will the Forest Service continue to contribute to forestry issues in the Caribbean Basin and the American Tropics? Almost certainly by reconsidering the relationships between native, naturalized, and nonnative species, now characteristic of many forests in the region. More than 70 years after near complete deforestation, Puerto Rico represents a valuable window into the mechanics and characteristics of forest recovery and conditions for environmental change—information important for a changing world. Studies have shown and described the emergence of new forest types in Puerto Rico that encompass native, nonnative, and naturalized species. These new forests arise naturally on abandoned and often degraded agriculture lands, conditions that are found throughout the tropics and that exhibit both positive and negative traits (Lugo and Helmer 2004). As forest fragmentation, degradation, and land-use change continue to occur and increase in the tropics, observations and lessons learned from Puerto Rico's emerging new forest types will lend important information to the development of management and conservation strategies for existing and diminishing primary forests in the tropics and the new forest types that are likely to emerge around them.

In addition, given the growing presence of forests within complex landscape dynamics, domestically and in the tropics, the FS will work to find a better understanding of the significance of landscape structure on ecosystem function in order to provide natural resource managers with the scientific basis needed to manage complex tropical landscapes. Research today and in the future will build on past stand-level studies to determine how landscape structures (e.g., fragment size and distribution, geomorphology, etc.) and ecosystem functions influence forest recovery at landscape and regional scales.

Also, as capital cities throughout the tropics grow, they will increasingly confront growing problems related to water quantity and quality. Therefore, the FS will

continue to carry out collaborative research and assistance to better understand forests as protectors of important watersheds.

Additionally, as secondary forests steadily gain interest as potential supplies of wood from “natural forests,” the FS will tap into its extensive experience in restoration of degraded forest lands throughout the tropics that was carried out during the 1990s in cooperation with the World Bank. The FS will continue to implement activities aimed at the improvement of site productivity and increasing timber and commodity production (Parrotta and Kanashiro 1995).

Furthermore, while the Forest Service continues to collaborate and provide assistance related to conservation education, multiple forest use, protected area management and conservation, and the promotion of nature-based tourism, in relation to these activities, the FS will focus on development, training and assistance related to interpretive and marketing materials, plant and wildlife inventory for improved interpretation, and conservation education and environmental interpretation in the Caribbean Basin and American Tropics.

Finally, as the FS continues to work and collaborate internationally, so too will cooperative activities and overseas consultancies continue through which the FS not only offers information and assistance to partners in other countries, but draws from foreign ingenuity to provide benefits to the United States through experiences with innovative technologies, resolutions to cross-boundary environmental problems, and a strengthening of international ties that lead to mutual aid such as during natural disasters (e.g., catastrophic fires, hurricanes) when the United States often receives help from other countries.

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Forestry in the Pacific Islands

Garland Mason
Pacific Southwest Station Assistant Director
Albany, California
and

J. Boone Kauffman
Director
Institute of Pacific Islands Forestry
Honolulu, Hawaii

Summary

This presentation gives an overview of the regional contribution of the Institute of Pacific Islands Forestry to tropical forestry within the context of the uniqueness of the Pacific islands. Examples of early accomplishments are given, as well as brief descriptions of current projects and partners. The projects focus on what are viewed as major issues throughout the islands: invasive species, wildfires, native forest restoration, water quality, and global change. The issues for the future are water, landscape processes and forest restoration, and global change. Processes associated with these issues can have devastating effects on the islands and their inhabitants. The Institute can make a difference by restoring and protecting the diversity of these unique biological systems, preventing extinctions of native plants and animals, and by assuring resources, knowledge, and training for local people to sustain traditional and honored native sustenance cultures.

Please see enclosed CD ROM with the Powerpoint presentation delivered at the meeting.

Un Siglo de Presencia del Servicio Forestal en Puerto Rico y las Islas Virgenes: Lecciones Aprendidas en que Fundamentar el Futuro

Blanca I. Ruiz
Environmental Education and Interpretation Program
Caribbean National Forest

Summary

This presentation gives a historical summary of the environmental and socio-economic conditions of Puerto Rico and the Virgin Islands from Spanish colonial times, i.e., 1493 to 1898. It goes into further detail on important environmental and social issues from 1899 to the present, while emphasizing the contributions of the USDA Forest Service in Puerto Rico and the Virgin Islands for the past 100 years.

English title: A century of the presence of the Forest Service in Puerto Rico and the Virgin Islands: lessons to build on as a foundation for the future

Please see enclosed CD Rom with the Powerpoint presentation delivered at the meeting.

The USDA Forest Service: A Time and Space Agency With an Attitude

Ariel E. Lugo
International Institute of Tropical Forestry

Introduction

The title of this talk summarizes what we have learned about the history of the Forest Service in the tropics. The Forest Service is an agency that operates in two types of spatial dimensions. The first one is geographic space. In the tropics, our main areas of operation are the U.S. Virgin Islands, Puerto Rico, the rest of the Caribbean, Central and South America, Hawaii, and Micronesia. However, as we will see later, our first Chief visited and influenced tropical forestry in the Philippines, and the activities of Forest Service employees span the whole tropical world.

The second type of spatial dimension of the Forest Service is ecological space. Ecological space is different from geographic space in the sense that it represents the environmental conditions that constantly change over geographic space. A large measure of the success of the Forest Service in the tropics is the realization that ecological space is the main determinant of how forests function and that to be able to conserve tropical forests we need to understand ecological space. Thus, the Forest Service in the tropics has worked diligently in dry, moist, wet, and rain forests on many types of geology and soils. The agency slowly established different conservation approaches for the different conditions that it encountered on geographical space.

The time perspective of the Forest Service includes the past, present, and future. However, the Forest Service mission of caring for the land requires the agency to keep records of the events that characterize the ecosystems it stewards for society. After a century of service, the Forest Service has accumulated significant knowledge and understanding about the conservation of forests from the tropics to the boreal regions of the world. Because of our commitment to places and our long history, we are one of the few organizations that can deal with the complexity of tropical forests and do so through long-term research and long-term management of lands, waters, and human relationships.

The attitude of the agency evolved from the passion of its founder Gifford Pinchot. Gifford Pinchot was responsible for organizing and operating the Forest Service from its inception and established many of the attitudes and procedures that

A large measure of the success of the Forest Service in the tropics is the realization that ecological space is the main determinant of how forests function and that to be able to conserve tropical forests we need to understand ecological space.

the agency still follows. I was impressed by his reaction to the complexity of tropical forests, when he visited the Philippines at the turn of the 20th century. His recommendations after his visit are summarized in the following two quotes (Pinchot 1947: 231) :

If this development [forest industries] is not to be accompanied by serious, extensive, and permanent injury to the forests, preparation by study and experiment must begin at once.

That three experimental ranges of no less than five thousand acres each be set aside for the practical study of methods of reproducing the best timbers, for experimental forest planting, and for other silvicultural work.

Clearly Pinchot recognized that if the tropical forest were to be harvested, it had to be protected and sustained as a functioning forest and research had to be conducted in support of forest conservation. This professional attitude toward forests is at the core of the behavior of the Forest Service in its stewardship of public resources.

The agency attitude is one of:

- Curiosity: through research, we get the facts.
- Service as in Forest Service
- Stewardship of natural resources
- Collaboration and partnership
- Conservation

This Regional Congress on Tropical Forestry is an opportunity to review 100 years of Forest Service activities in the tropics and for all of us to evaluate what we have done as we set our sights into another century of service. This morning the Forest Service gave its report. This afternoon corresponds to public reaction. You will have an opportunity:

- To evaluate what we have done over the last 100 years (the good, the bad, and the ugly).
- Advise us on what we should do more of. Less of.
- Give us any recommendations you have for our programs as we enter a new century of service.
- Draft any resolutions you believe we should present at the National Congress next January.

We look forward to your assessment of our work, your reaction to our accomplishments and your suggestions for change and improvement.

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Acknowledgments

Name	Agency	Assistance provided
Baez, José	Municipality of Caguas Center of Fine Arts	Help and support before and during the congress
Cabrera, Glenda	Veteran's Affairs San Juan, Puerto Rico	Assisted in the meals and refreshments area
Casanova, Juan Carlos	Puerto Rico Department of Natural and Environmental Resources Toa Vaca Reservoir	Support provided by Toa Vaca Reservoir crew
Cordero, Marcos	Veteran's Affairs San Juan, Puerto Rico	Created the delegate group signs
Díaz, Carlos	University of Puerto Rico Río Piedras Campus	Coordinated use of Botanical Gardens including trolleys
Figueroa, Humberto	Puerto Rico Department of Natural and Environmental Resources	Designed banner
Fontanez, Norma	Veteran's Affairs San Juan, Puerto Rico	Assisted in the meals and refreshments area
Gonzalez, Edgardo	Puerto Rico Department of Natural and Environmental Resources	Facilitated the cooperation of the Department of Natural and Environmental Resources
Gonzalez, Melwin Agronomist	University of Puerto Rico Mayagüez Campus	Provided plants from Mayagüez Nursery
Gracia, Anibal	Municipality of Caguas	Decorated the stage with plants
Juncos, Carme Administrator	Municipality of Caguas Center of Fine Arts	Help and support before and during the congress
Laboy, Jose Israel	Puerto Rico Department of Natural and Environmental Resources	Decorated area with plants provided by Department of Natural and Environmental Resources
Matias, Melvin	Veteran's Affairs San Juan, Puerto Rico	Construction of <i>Bohío</i>
Miranda Marin, William	Mayor of Caguas	Donated use of Center of Fine Arts
Morales, David	Puerto Rico Department of Natural and Environmental Resources	Decorated area with plants provided by Department of Natural and Environmental Resources
Nunci, Helen	Veteran's Affairs San Juan, Puerto Rico	Collaboration in organizing centennial luncheon
Olivero, Maria	Veteran's Affairs San Juan, Puerto Rico	Coordinated photograph and video shoots
Ortega, Omarf	Municipality of Caguas	Coordinated the use of Fine Arts Center and luncheon provided by municipality
Ortiz, Vicente	Puerto Rico Department of Natural and Environmental Resources	Decorated area with plants provided by Department of Natural and Environmental Resources

Name	Agency	Assistance provided
Ramos, Marcos	Puerto Rico Department of Natural and Environmental Resources Director, Mayaguez	Provided vehicles for transportation of plants from nursery to congress location
Reyes, Milagros	Veteran's Affairs San Juan, Puerto Rico	Assisted in the meals and refreshments area
Rivera, Jorge	Veteran's Affairs San Juan, Puerto Rico	Took photographs on both days of congress
Rivera, Maria	Municipality of Caguas Center of Fine Arts	Help and support before and during the congress
Rodriguez, Felix	Veteran's Affairs San Juan, Puerto Rico	Took videos on both days of congress
Santos, Angel	Veteran's Affairs San Juan, Puerto Rico	Assisted in the meals and refreshments area
Serrano, Jaime	Puerto Rico Department of Natural and Environmental Resources	Transported plants from Mayagüez to Caguas
Soto, Nelson	Puerto Rico Department of Natural and Environmental Resources	Transported plants from Mayagüez to Caguas
Tirado, Felix	Veteran's Affairs San Juan, Puerto Rico	Construction of <i>Bohío</i>
Torres, Wanda	Veteran's Affairs San Juan, Puerto Rico	Assisted in the meals and refreshments area
Velazquez, Max	Veteran's Affairs San Juan, Puerto Rico	Took photographs during both days of congress
Velez, Abraham	Veteran's Affairs San Juan, Puerto Rico	Construction of <i>Bohío</i>

Appendix 1: Historical Photos

Please see enclosed CD Rom

Appendix 2: Posters

Please see enclosed CD Rom

Appendix 3: Reports by Delegate Groups and Voting Results

Editor's Preface

On August 26–27, 2004, Puerto Rico held its Tropical Forestry Congress in celebration of the Forest Service's centennial anniversary. The delegation of participants were divided into groups and given the names of tree species native to Puerto Rico: Ausubo, Ceiba, Guayacán, Laurel Sabino, and Tabonuco. Each group was assigned a facilitator and a note taker.

The flip charts with the notes taken at the time of all the group sessions, except for the Guayacán group, were subsequently entered electronically at the congress and given to the Institute where they are archived. In addition, two groups—Tabonuco and Laurel Sabino—kept the original paper flip charts and they, too, are being held at the Institute for archival purposes. These documents can be viewed by the public upon request.

It is important to note that group facilitators, note takers, and indeed, some group participants speak English as a second language. Therefore, with an aim toward clarity and ease in reading, the flip charts developed by the groups have been edited to follow a narrative format and with every effort to preserve the intended meaning.

Mildred Alayón Álvarez

AUSUBO

Facilitator: Freddy Santana
Recorder: Christine Dennery
Group Representative: Abel Vale

Participants	Signature
1 Abel Vale	/s/ Abel Vale
2 Alan Mowbray	/s/ Alan Mowbray
3 Aurea Moragón	/s/ Aurea Moragón
4 Elliot López	/s/ Elliot López
5 Javier Almeyda	/s/ Javier Almeyda
6 Jéssica Rodríguez	/s/ Jessica Rodríguez
7 Jorge Báez	/s/ Jorge Báez
8 Linda Vélez	/s/ Linda Vélez
9 Luis E. González Vales	/s/ Luis E. González Vales
10 Luis Miguel Rico	/s/ Luis Miguel Rico
11 Máximo Cerame Vivas	/s/ Máximo Cerame Vivas
12 Orlando Carrasquillo	/s/ Orlando Carrasquillo
13 Rosa Franqui	/s/ Rosa Franqui
14 Sidney Salyer	/s/ Sidney Salyer
15 Terry Hueth	/s/ Terry Hueth
16 Tito Santiago	/s/ Tito Santiago
17 José Colón	/s/ José Colón
18 Ariel Ramírez	/s/ Ariel Ramírez

It was agreed that urban development is a problem in Puerto Rico that can be addressed by the Forest Service. Because of this urbanization approach, Puerto Rico now needs reforestation.

Ausubo Group

Brainstorming on the Forest Service's history ensued owing to lack of specific knowledge on the subject. Many questions were posed. A few delegates stated that the presentations this morning were really appropriate in responding to questions about the history of the Forest Service. One delegate began a brief summary of the history of the Forest Service. It was agreed that urban development is a problem in Puerto Rico that can be addressed by the Forest Service. Because of this urbanization approach, Puerto Rico now needs reforestation. Some stated that the Forest Service's original mission had been more science-based but that it was now becoming more recreational. General consensus was reached on the need for reforestation in the tropics because forests are a rapidly depleting resource at a global scale. The agency needs to promote the rescue and conservation of tropical forests and open more marketing opportunities for tropical forest products. There is a general trend of involving business as stakeholders in the conservation of tropical forests. However, the Forest Service doesn't know how to synchronize these efforts with companies to achieve a plan that will preserve tropical forests. One delegate

mentioned that Hillary Clinton was promoting a project that would use the different woods of the Caribbean National Forest.

Most agreed that the agency needs to improve in providing access to information (maps, geographic information systems, etc.), in developing a Web site easy for people to retrieve information from, in providing educational outreach programs for mentors and communities, in promoting multidisciplinary and applied research, and in increasing interagency liaison. The agency also needs to buy additional lands, focus research on identifying and promoting ecological corridors, increase technical assistance to private landowners through nongovernmental organizations using stewardship programs, and request more funds to increase protected areas.

The general consensus appeared to be strong on disallowing military activities in the Caribbean National Forest. There is a lack of communication because the public does not seem to receive information about ecosystem research. Most research stays with the researchers, and the public is not informed on the importance of the ecosystem. Research results should be simplified so the public understands why this research is important to them. The ecological impact of insects is not studied sufficiently and therefore people are not aware of the importance of insects to the environment. The agency needs forest management programs that specify to the public the ultimate cost of ecological disturbances in Puerto Rico. It is not promoting management, and the agency should do so to preserve the national forest in Puerto Rico. Some delegates felt that the Forest Service in Puerto Rico does not teach people to appreciate and conserve their natural resources; in other small islands, with a smaller budget for this program, people conserve their natural resources better than we do. The Forest Service needs to be more aggressive in terms of fostering education in schools and communities on the importance of preserving natural resources and tropical forests so children will grow up knowing the importance of preserving our natural resources. An educational campaign is expensive but necessary. Delegates also encourage purchasing the land around the Caribbean National Forest.

In general, delegates felt that the agency should continue to preserve tropical forests. However, while some delegates felt that there was not enough educational and community outreach, particularly with those neighbors in the forest, others felt that the agency was working with communities and teaching them the importance of preserving natural resources and tropical forests. More access for the physically challenged was presented as a required improvement as well as clearing access in the national forest for hikers.

Generally speaking, delegates saw as positive action by the agency its efforts at land management, environmental education programs for teachers at El Portal, and the protection and preservation of natural ecosystems such as watersheds.

There is scientific access, awareness, wide use of the library, availability of maps in both languages, managing of the land notwithstanding environmental obstacles, community participation, job programs, and interpretation programs. Several research programs, such as that being done in tropical forests, are excellent. Also good are the educational programs that will improve the management of schools and creation of future scientists and the conservation of forest resources. Some delegates wanted to focus exclusively on tropical forests in Puerto Rico, especially as related to the Caribbean National Forest, because that is the topic they are familiar with; others, however, wanted to address issues in more general terms.

Recreation, volunteer programs, promoting public participation, international programs, participation in the different processes, assistance to private landowners in managing their properties, protection of all natural resources, collaboration with land buyers for reforestation to recover the forest, and opportunities for communities to manage reserves appropriately and conserve them were seen as areas needing improvement.

Generally speaking, delegates saw as positive action by the agency its efforts at land management, environmental education programs for teachers at El Portal, and the protection and preservation of natural ecosystems such as watersheds. They also agreed that recreation facilities, infrastructure access, interpretation at the national forest, and the Seniors Program were areas where the agency was on the right track at Caribbean National Forest. Delegates felt that no one was better at managing the Caribbean National Forest than the Forest Service.

As far as the Institute, delegates felt there was good access to research (scientific access through the library and the lab). Some felt that there should be more research conducted in sites other than the national forest, whereas others felt research should focus more on management practices in the forest. Some delegates felt that public participation is achieved through State and Private Forestry efforts such as stewardship, legacy, urban and community forestry, forest health initiatives, conservation education, and cooperative fire programs. Delegates also felt that the Institute was doing a good job with their International Cooperation program.

CEIBA

Facilitator: Lizzette Vélez

Recorder: Liz Camacho

Group Representative: María Falcón

Participants	Signature
1 Aixa Mojica	/s/ Aixa Mojica
2 Blanca Ruiz	/s/ Blanca Ruiz
3 Diana Ju	/s/ Diana Ju
4 Edgardo González	/s/ Edgardo González
5 Edgardo Martínez	/s/ Edgardo Martínez
6 Ernesto Medina	/s/ Ernesto Medina
7 Fernando Lloveras	/s/ Fernando Lloveras
8 Gayle Hueth	/s/ Gayle Hueth
9 Grizelle González	/s/ Grizelle González
10 José Ortega	/s/ José Ortega
11 María Falcón	/s/ María Falcón
12 Pedro Ríos	/s/ Pedro Ríos
13 Sally Collins	/s/ Sally Collins
14 Sandra Molina	/s/ Sandra Molina
15 Juliann Aukema	/s/ Juliann Aukema
16 Anselmo de Portu	/s/ Anselmo de Portu

Ceiba Group

Delegates considered many subjects when discussing the Forest Service's performance in Puerto Rico. They began by indicating that the agency should be moving on to the next level in research. Research should integrate land managers and the community. Public demands should not be ignored. More training on cultural diversity and in communication within cultural differences should be enhanced so that the agency can present a more positive image to people of other countries. The agency also needs to be more proactive in many areas. It needs greater interaction with the community, improved communication across language barriers, and should encourage citizen participation in the processes. People need more education in the field of conservation. In terms of the International Institute of Tropical Forestry library, access needs to be improved island-wide by opening the library electronically for potential users that would otherwise not have access to its services.

In terms of State and Private Forestry, the agency needs to improve the role of Private Forestry. Continued research is needed on the impact of fire on ecosystems and integration between national,¹ state, and private forestry in dealing with this

¹ Editor's note: by "national" we understand the group to be referring to those forests owned by the federal government, as in Caribbean National Forest.

threat. Cooperative forestry promotes private forestry through landowner grants; however, national forests appear to play a larger role in these grants. More work is needed in the development of forest management plans by seeking greater participation from managers, the public, and academia. In the administration of these forests and its human resources, keep striving toward a diverse workforce. In the area of recreation, the agency needs to move forward in its quantity and quality.

How much wood is used worldwide? National forests used to provide for this resource, yet now they produce less than 5 percent. The agency should be looking into providing for more in this area as a means of economic self-sustenance. More research should be geared toward addressing what is needed to provide for wood extraction. Mahogany (*Swietenia* spp.) could be a means to this end, and added funding for research in this area should be actively sought. The agency needs to expand collaboration on tropical forests with other nations at the international scale. It should participate in the development of timber production in forests that have sustainable forest management plans.

In the local arena, the Forest Service should prioritize extending the northeast ecological corridor to the coast, thus opening up greater opportunities to expand knowledge of the services provided by the environment. More efforts need to be expended on the protection of native species by pursuing research that will allow us all to better understand these species. Domestic animals exotic to the national forest (such as cats and dogs) need to be kept away from the forest. The government should provide for shelters to address this issue. To improve on the management of the national forest, the agency should increase training on forest land management and research, create plantations for rare and exotic plants, provide more interpretive programs for visitors, increase its water management program, and buy more land. In addition, research should address conservation management. Greater efforts toward public outreach should be pursued so that the public can be informed regarding what is being done by the agency. There is great interest by the public and they want to be informed.

The country needs to work harder at seeing the environment and its products as something of value. An example of demonstrating how the environment provides a valuable product would be ensuring clean water and then bringing it to the community. The agency also needs to formulate methods of producing financing for the protection of the environment. It needs to be more proactive. The national forest should be looked at holistically, from the top of the mountain down to the coast, so that we can see what will affect the forest in the next 100 years. However, the agency should not limit itself to the national forest but also study what is

outside of the forest. Why not study other forest types? How can damage to these resources be prevented? The agency also needs to recognize that there is a world-wide shift toward recreation as a result of the growth in population; however, managers need to limit uses within these lands to ensure its sustainability. To do this, tough laws are needed and people to enforce them. It is becoming a social problem. Managers need to be more aware of this shift in focus and provide for protection by controlling access. People need to be taught to take care of the land. How do we manage both population growth and land preservation? Educate the people: “If you want to protect your water, protect your mountains.”

It appears that there was disagreement among the delegates concerning what the Forest Service should stop doing. However, they did come to the following items as things that should be discontinued.

The Forest Service should stop projecting itself as the “know-it-all” agency. There is an image problem at the core of this agency’s delivery. Instead of dictating, a better approach would be one of working together. Rather than ignoring situations experienced by other countries, learn from them. Don’t be afraid to sever ties. Start challenging local government and at some point work toward stopping development on some lands. Stop experimentation that would be detrimental to the national forest or the environment. This type of experimentation, if necessary, should be pursued elsewhere.

As far as things that the agency should continue, scientific research in tropical forestry has been doing a good job in preparing teachers and leaders worldwide. What was once long-term forestry is now long-term research, and this focus has been successful. The level of research has risen and productivity can be seen in its publications. The information available as a product of this research is very accessible and helpful, for example, through the Internet, and through consultation with dependable experts. The library is a valuable resource and free access to the expertise it provides is available.

The agency is protecting our natural resources and this can be increased by adding lands. Safety at the national forest is excellent and this could only have been achieved by an improved forest management. The Forest Service has also excelled at helping other countries such as the Dominican Republic, Jamaica, and Costa Rica for example, not only in emergency responses but also in management strategies for their lands.

The Forest Service provides an independent voice that helps with decisions and is not afraid of saying things publicly. This voice is not just an opinion but a credible source recognized for its good work. The agency in Puerto Rico has hired

many locals, respecting cultural differences and diversity in the workforce. By doing this, it has provided a workforce with staying power that has been exposed to long-term issues with a cultural advantage that aids in communication and makes it unique. In general terms, the Forest Service in Puerto Rico has done well, with room for improvement, in four areas: education, collaboration, research, and management.

GUAYACÁN

Facilitator: Nancy Vélez
Recorder: Rosalry Colondres
Group Representative: Luis Jorge Rivera Herrera

Participants	Signature
1 Angel Tosca	/s/ Angel Tosca
2 Beatriz Hernández	/s/ Beatriz Hernández
3 Carolyn Krupp	/s/ Carolyn Krupp
4 Danilo Chinaea	/s/ Danilo Chinaea
5 Garland Mason	/s/ Garland Mason
6 Joel Holtrop	/s/ Joel Holtrop
7 John Thomlinson	/s/ John Thomlinson
8 Luis Jorge Rivera Herrera	/s/ Luis Jorge Rivera Herrera
9 Luis Rivera	/s/ Luis Rivera
10 Luz Cuadrado	/s/ Luz Cuadrado
11 Magaly Figueroa	/s/ Magaly Figueroa
12 Miguel Muñoz	/s/ Miguel Muñoz
13 Nelson Velásquez	/s/ Nelson Velásquez
14 Ronald J. Canneralla	/s/ Ron Cannarella
15 Vivian Vera	/s/ Vivian Vera
16 Walter Chávez	/s/ Walter Chávez
17 Wanda Colón	/s/ Wanda Colón
18 William Gould	/s/ William Gould

Guayacán Group

Editor's Note:

We understand that at the time of the congress, the flip chart was used and notes were taken. The group representative worked directly from the flip chart and prepared the power point presentation. However, the flip chart was not kept nor was an electronic copy provided.

In addition, at the time of voting for the resolutions, they decided to independently exclude the resolution referring to the karst region, as it had been addressed by another group.

LAUREL SABINO

Facilitator: Evelyn Cruz

Recorder: Zaida

Group Representative: Elvira Cuevas

Participants	Signature
1 Brook Edwards	/s/ Brook Edwards
2 Carlos Rodríguez	/s/ Carlos Rodríguez
3 Carolyn Pabón	/s/ Carolyn Pabón
4 Denny S. Fernández	/s/ Denny S. Fernández
5 Domini Morales	/s/ Domini Morales
6 Elvira Cuevas	/s/ Elvira Cuevas
7 Eugenio Santiago	/s/ Eugenio Santiago
8 Francisco Watlington	/s/ Francisco Watlington
9 Fred Scatena	/s/ Fred Scatena
10 Hilda Díaz-Soltero	/s/ Hilda Díaz-Soltero
11 José Salguero	/s/ José Salguero
12 Julio C. Figueroa	/s/ Julio C. Figueroa
13 Manuel Ortiz	/s/ Manuel Ortiz
14 Migdalia Álvarez	/s/ Migdalia Álvarez
15 Miriam Salgado	/s/ Miriam Salgado
16 Myrna Aponte Reyes	/s/ Myrna Aponte Reyes
17 Pedro Juan Rivera	/s/ Pedro Juan Rivera
18 Víctor Cuevas	/s/ Víctor Cuevas
19 Yajaira Rodero	/s/ Yajaira Rodero

Laurel Sabino Group

The Forest Service in Puerto Rico is known for the quality of its research and its relevance to tropical forest management. Research has been conducted in a wide range of areas, and International Institute of Tropical Forestry (IITF) products are the technical and scientific publications that reach the general public. Recognition of the agency's research program in Puerto Rico is international in scope, particularly in the tropics. Although there is room for improvement, the Institute's library is a resource for local undergraduate and graduate students. The Institute is a center for technical training for the Caribbean and Latin America.

The group called attention to establishing a difference between management (Caribbean National Forest [CNF]) and research (IITF). Again, although there is room for improvement, based on surveys, passive recreation in harmony with natural resources is enjoyed in the CNF. The forest has a management plan, and as public policy, all forest activities are analyzed and put in practice based on this plan. However, there is room for improvement in some areas; for example, the Parrot Aviary needs better facilities. In addition, the CNF plan is neither easy to read nor clear in its definition of terms. Given land use around the periphery of the forest,

it appears that there is no buffer zone. The agency needs to be more aggressive in preventing development in this zone; it needs to write letters, attend public hearings, and look toward seeing that this special zoning law is enforced.

Access to the Director and Forest Supervisor is very good. They are open to the media and are honest in their responses. Nevertheless, the Forest Supervisor's tenure at the head of his unit has been too long. Although communication with the media by these units is very good, that does not appear to be the case with communication with each other. The appearance is that there is a war going on between CNF and IITF.

Interests between federal and state laws clash, and this fosters a feeling of being in a "no man's island." Forest Service policy at the national level conflicts with policy in Puerto Rico. Many in the group felt it important to note that the agency does not seem to realize that the national forest (El Yunque or CNF) belongs to the people of Puerto Rico. The CNF is well managed but could improve: more land should be acquired, proposals need to be developed, and continued interaction with forest communities must be pursued. The Seniors Program, which provides education and training could be improved in the area of providing tour guides, and preparing the guides for this task.

The agency needs to review its internal processes at the CNF. Whereas on the one hand, the permit request process is highly bureaucratic and difficult, on the other hand some in the group believe that research permits are granted for an excessive period. These permits should be evaluated on a yearly basis, and all special use permits need to go through a consultation procedure.

The CNF either needs to have better trained management personnel or perhaps hire more people. Law enforcement is so minimal it doesn't appear to exist. The western side of the forest requires attention, and the forest in general could be improved by an increase in signs and better hiking roads.

Poor communication exists at the intra- and interagency level. As an example, there has been such poor communication between the U.S. Fish and Wildlife Service, which manages the aviary, and the CNF, which manages the forest, that some fear that the parrot will be managed into extinction. The agency needs to improve the parrot recovery program and build the aviary in a more appropriate ecological zone.

There is a patent need for an interpreter to serve as intermediary in the "translation" of research to the public: some kind of liaison between scientific personnel and their products and the community. In addition, research focus should address other areas such as timber and wood usage, ethnobotany, native species, and nonwood product use. Although research in Puerto Rico is addressing a wide range

of technical fields, there are additional areas that should be pursued: more study should be devoted to inventory and its use; more research is needed on secondary forests and restoration; and the agency should ensure that the research done is relevant to management problems not only for the CNF but also for Puerto Rico's state forests and for tropical forests in general. In addition, continued support for the Institute's work in Brazil was recommended.

Although some delegates voiced concern over what they considered poor management and recovery of threatened and endangered species, as well as endemic species, others proposed that the standing policy against exotic fauna be modified to allow planned introduction of terrestrial and arboreal nonvolant land mammals that would replace extinct native species. They felt this could contribute to restoring the forest's original ecosystem.

In general terms, other areas of improvement voiced by some delegates included public relations, environmental education to low-income communities, representation of Puerto Rican and Latin American scientists at IITF, and more opportunities for professional development for employees in Puerto Rico as opposed to mainland United States.

Facilitator: Ramiro Villalvazo
Recorder: Israel Rodríguez
Group Representative: Patricia Weaver

TABONUCO

Participants	Signature
1 Andrew Carver	/s/ Andrew Carver
2 Brick Fevold	/s/ Brick Fevold
3 Cem Basman	/s/ Cem Basman
4 Eileen Helmer	/s/ Eileen Helmer
5 Esther Rojas	/s/ Esther Rojas
6 Felipe Blanco	/s/ Felipe Blanco
7 Felipe Cano	/s/ Felipe Cano
8 Gerald Bauer	/s/ Gerald Bauer
9 Jeff Walker	/s/ Jeff Walker
10 Jerilyn Levi	/s/ Jerilyn Levi
11 Jorge L. Frangi	/s/ Jorge L. Frangi
12 Kathleen McGinley	/s/ Kathleen McGinley
13 Laura Cornwell	/s/ Laura Cornwell
14 Leigh S. Beck	/s/ Leigh S. Beck
15 Mit Parsons	/s/ Mit Parsons
16 Nick Brokaw	/s/ Nick Brokaw
17 Patricia Weaver	/s/ Patricia Weaver
18 Ruth McWilliams	/s/ Ruth McWilliams
19 Sebastián Martinuzzi	/s/ Sebastián Martinuzzi
20 Zoraida Bas	/s/ Zoraida Bas

Tabonuco Group

The delegates agreed to refer to those areas where, although the Forest Service in Puerto Rico has been effective, improvement is encouraged. In terms of human resources, the agency has been a trainer of tropical foresters at an international scale. It has provided postdisaster assistance to tropical countries, supported sustainable tourism as an economic resource, been at the forefront in multicultural efforts, and in Puerto Rico kept the cultural tradition of hospitality and service to visitors.

Highlights in forest management include island reforestation, monitoring and inventory, contributing to the improvement of forest practices, and reduced impact-logging. Conservation efforts by the agency have fostered an open door (or portal) to tropical forest conservation. The agency created the conservation icon of the Puerto Rican parrot as an ever-present reminder of how conservation efforts can rescue an endangered species. However, rescuing this species was also a product of research.

Much research is conducted by the Forest Service in Puerto Rico. Scientists in Puerto Rico conduct tropical forestry research in several countries around the world. Research on threatened and endangered species and the implementation of this research has an impact, as witnessed by rescue of the Puerto Rican parrot. Research conducted by agency scientists on the island is also adapted to meet local natural resources goals. Statistics and data are collected by Forest Service personnel and specialists, and technical publications are made available worldwide, thereby establishing what external users and environmental advocates see as evidence of the agency's credibility.

The agency should, however, improve on sustainable practices to reflect the integration of environmental, social, and economic factors and benefits. It needs to improve or increase the "human dimension" of its research to incorporate social concerns and issues. More resources need to be devoted to forest inventory and monitoring at an international scale. The agency also needs to increase its efforts and successes in tropical forestry research in an effort to deal with natural forest management and fast-growing plantations in large-scale logging.

Internal communications between the different programs also needs improvement. Research should be used to contribute to the development of an interdisciplinary approach and to integrate all the sciences. The agency needs to improve at monitoring and documenting the impacts and benefits received by communities.

The Forest Service needs greater self-criticism of its scientific approaches and more emphasis on the study of the links between human health and ecosystem health. The Forest Service needs to understand the connection between human health and biodiversity and not discard traditional ecological knowledge of indigenous peoples. More communication between tropical forestry regions is needed, and an international tropical forestry policy should be developed. The agency needs to understand its markets and audience; a benefit of having Ariel on the road.

Specific recommendations include committing to long-term assistance to the Tapajos project (National Forest in Brazil), increasing relevant research on invasive species, committing to long-term technical assistance in Central America, and committing to improving inventory and monitoring data from stands to landscapes in the Caribbean Region.

Voting results—

Resolutions were voted for on the second day of the Congress. The voting process was not to select one resolution over another, but to determine consideration of the resolutions for the Forest Service.

There were 86 delegates present. Following are the voting results:

The Ausubo group:

- If we agree that Puerto Rico is a paradigm between population density and resource availability, the USDA Forest Service should place special attention toward increasing research related to the concept of the “ecological footprint” in the tropics (54 votes).

The Ceiba group did not present any resolution.

The Guayacán group prepared six resolutions but only presented five to avoid repeating a resolution that had already been presented by another group:

- Improve communication of the strength of the Forest Service reestablishing the public affairs efforts (84 votes).
- Increase collaboration between the Institute of Pacific Islands Forestry and the International Institute of Tropical Research (68 votes).
- Recommend coordinating the management of land suitable for preservation and restoration of lowland forests (moist, dry, coastal) and habitat for endangered species (62 votes).
- Focus on the opportunity of rescuing, as much as possible, high-quality lands recently available, e.g., Roosevelt Roads and Sabana Seca (57 votes).
- Recognize efforts of the Forest Service and partners in conservation and preservation of endangered species (52 votes).

The Laurel Sabino group:

- The Forest Service, jointly with the Puerto Rico Department of Natural Resources and Environment, interested nongovernment organizations and universities, help in the protection of the karst area of Puerto Rico, conduct relevant research, and manage it for water and biodiversity (79 votes).
- Integrate cultural difference and interests of Puerto Rico in the management of the forest. Consider management based on the *Casa Pueblo* example (65 votes).
- Incorporate the forested and wetland areas in Roosevelt Roads to the El Yunque Forest (42 votes).

The Tabonuco group:

- Continue/increase technical assistance and training in tropical forest countries (84 votes).
- Incorporate the human dimension and social concern aspects into research (81 votes).
- Improve visibility with internal and external customers (78 votes).

Appendix 4: Presentations of the Delegate Groups

Please see enclosed CD Rom

Appendix 5: Contributed Articles

The articles that follow were not a part of the presentations given at the Centennial Congress. They were voluntarily submitted by delegates to the Congress as thought-provoking essays.

Roads, Radar and Research: The U.S. Military and the Luquillo Forest Reserve

Alan Mowbray
USDA Forest Service, Caribbean National Forest
August, 2004

Overview

Over the past century, the U.S. Department of Agriculture Forest Service has entered into several agreements and partnerships with various U.S. military agencies that have involved the Luquillo Forest Reserve. The first recorded partnership occurred during the so-called Civilian Conservation Corps (CCC) period in Puerto Rico. Beginning in 1934, reserve officers of the U.S. Army were assigned to “temporarily command” CCC labor camps on the island and to supervise the activities of work crews in the forest. The work consisted of road and trail building and the construction of bridges and buildings in the forest’s recreation areas. Command of the camps and work projects was subsequently assumed by local supervisors, and the military officers were relieved of their CCC duties and reassigned elsewhere.

The first significant occupation of a portion of the forest by a military unit occurred as a result of the U.S. Army’s preparations for World War II in the Caribbean. In 1942, Army engineers built a road and laid a telephone line from the Mameyes-Río Blanco road to El Yunque peak. When construction was completed, an Army Signal Corps detachment was deployed to the peak to install and operate an early-warning radar set. This small contingent remained in the Luquillo forest until December 1943 when the threat of an attack on Puerto Rico and the Caribbean by Axis forces had subsided.

There is no further record of military activity in the Luquillo forest from late 1943 until the 1960s.

In 1961, the Atomic Energy Commission was looking for ways to “peacefully” employ atomic explosions to create canals and harbors as part of “Project Plowshare.” One of the proposals being studied was the feasibility of constructing

Beginning in 1934, reserve officers of the U.S. Army were assigned to “temporarily command” CCC labor camps on the island and to supervise the activities of work crews in the forest.

a sea-level canal through southern Panama by employing this method. In a related Army research contract, a portion of the Luquillo Forest Reserve was used by scientists from the University of Puerto Rico-Mayagüez, Nuclear Research Center to determine the effects of gamma radiation such as that which would result from atomic excavation in Panama on tropical vegetation. Project Plowshare was subsequently cancelled by the U.S. government owing to public pressure.

In 1963, under the terms of an interagency agreement with the U.S. Department of Agriculture Forest Service, the U.S. Navy began the second significant occupation of a portion of the forest by a military unit when they constructed an electronic site on East Peak (Pico del Este). The Navy initially operated the site as a guided missile operations control unit. It was subsequently used as a joint surveillance site (JSS) and as an important part of the Atlantic Forces Weapons Training Facility electronic warfare range until it was shut down in 2003 owing to a U.S. government decision to deactivate Naval Station Roosevelt Roads and its associated commands and facilities.

Between 1963 and 1965, under a contract from the U.S. Army Biological Laboratory and the Advanced Research Projects Agency, the U.S. Agricultural Research Station at Mayagüez studied the effects of heavy dispersal of the arboricide Picloram ("Agent White") on a 1-acre plot in the Luquillo Forest Reserve. The U.S. Army was interested in determining a practical method of rapidly defoliating the jungles and forests of Vietnam in order to deny cover and concealment to enemy infiltrators.

The U.S. Army and the CCC in the Luquillo Forest Reserve: 1933–1934

The CCC years in the Luquillo forest began in 1933 with President Franklin Roosevelt's authorization of an emergency public works program for Puerto Rico on May 3, 1933. The work was to be accomplished by the recently conceived CCC. The plan was contingent upon Chief Forester R.Y. Stuart's work plan that had been approved by CCC Director Robert Fechner 6 days earlier. The plan called in part for CCC work projects to be implemented in the Luquillo forest supervised by U.S. Army reserve officers under the overall control of Forest Supervisor William D. Barbour. An initial enrollment of 1,200 Puerto Ricans was planned. The CCC camp organization in the forest was set up according to work project size. Larger projects required a permanent camp managed (in the early years) by a military staff, whereas smaller projects were often located near enrollees' homes. Work projects on the Luquillo forest included transportation and recreation improvements as well as



Figure 1—PR-191 road construction, Luquillo Forest Reserve 1934.

reforestation projects. The first project was to “build a road through the cliffs and jungles of the Luquillo mountains,” opening the area for recreational development (fig. 1). By 1934, as the CCC program matured in Puerto Rico, camp command and project leadership was assumed by a combination of local supervisors and U.S. Department of Agriculture Forest Service officers. Regular and Reserve Officers who had started with the CCC program on the island were gradually transferred back to their former posts in the U.S. Army or released to civilian life (National Association of CCC Alumni 2001)

The U.S. Army on El Yunque Peak, 1942–43

The military planning that would ultimately bring a small U.S. Army contingent to the Luquillo forest had been set in motion by December 1941. The Japanese attack on Pearl Harbor in the Hawaiian Islands had thrust the United States into World War II. Earlier that year, the U.S. War Department had established the Caribbean Defense Command, with headquarters in the Panama Canal Zone. Under the guidance of Lieutenant General F.M. Andrews, the new command had assumed operational responsibility over naval and air forces assigned to protect the Atlantic Frontier from potential German attack, should the United States become involved in the war in Europe. This new command assumed authority over the existing U.S. Army Puerto Rico Department including such elements as the 65th Infantry

The first project was to “build a road through the cliffs and jungles of the Luquillo mountains,” opening the area for recreational development.

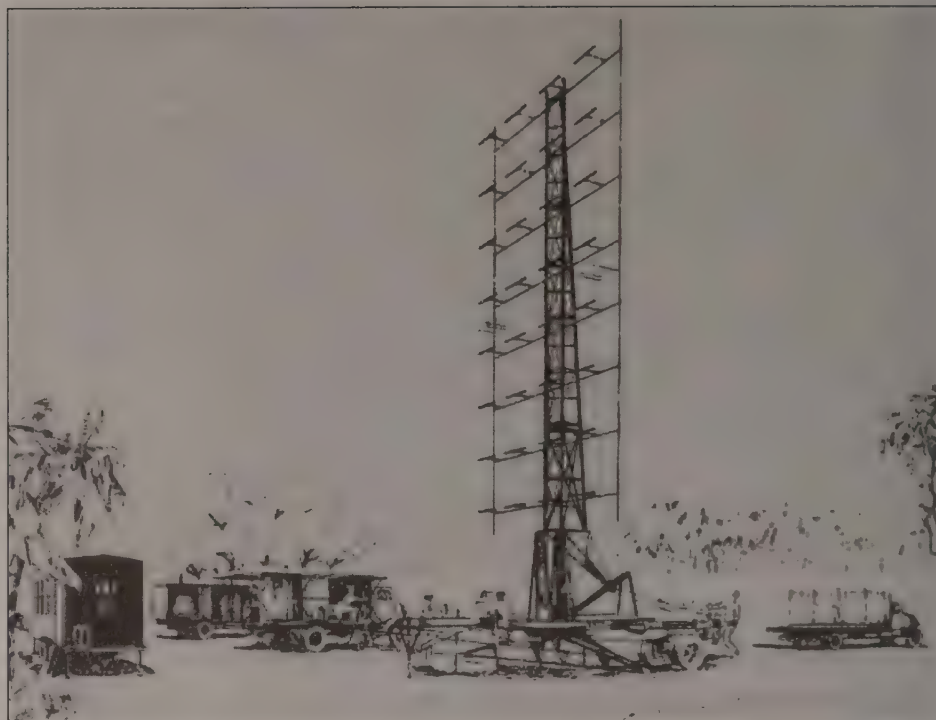


Figure 2—SCR-270 radar installation (U.S. Army Signal Corps).

Division and a Signal Corps Air Warning Company deployed in San Juan. The Air Warning Company had the responsibility to detect the approach of enemy aircraft to the island. In early 1942, army engineers constructed an access road and laid a telephone line from what is now km 13, PR 191 (the Mameyes-Rio Blanco road), through a part of the dwarf forest to the top of El Yunque Peak. The new road rose from an elevation of 760 meters to 1000 meters. An SCR-270 type search radar (identical to the radar set that had detected the approach of Japanese aircraft to Pearl Harbor on December 7, 1941) was installed on the peak (fig. 2).

A small barracks building was built to house off-duty Signal Corps troops. The radar set had a maximum range of 241 kilometers and was manned by operators and technicians detached from the Air Warning Company in San Juan. Position information obtained by the radar was to be sent to the San Juan Information Center over the telephone line where it would be integrated with information obtained from other sources on the island (an optical height finder at El Morro fort, etc.) and placed on a “plotting board” for subsequent tactical decisionmaking by the army staff.

The buildings that presently house the U.S. Fish and Wildlife Service (USFWS) Parrot Aviary in the Luquillo Forest were constructed by the army during this period and were used as quarters and messing facilities by the off-duty radar and observer crews. The El Yunque Peak detachment performed air defense early-warning surveillance and coastal observer duties for the army until late 1943. At that point the potential threat to Puerto Rico and the Caribbean islands from German submarines or from Japanese bombers launched from aircraft carriers was judged to be virtually nonexistent after the Allies had attacked and neutralized North Africa and the U.S. Navy was containing the Japanese fleet in the Pacific by winning battles in the Marshall Islands and the Coral Sea. The remains of the metal radar operations enclosure in which the radar operators scanned their instruments were still to be seen on El Yunque Peak until fairly recently, when they were demolished and removed owing to the structure's asbestos content. The small barracks building was used as the foundation for the building of the El Yunque lookout tower structure, and is still very much in use by visitors to the forest (Conn et al. 1996, Suffield 1995).

Gamma Radiation Research in the Luquillo Forest Reserve-1961

In 1961, as a part of the "Atoms for Peace" program initially proposed by President Dwight D. Eisenhower in a 1953 speech, the U.S. Atomic Energy Commission (AEC) began work on Project Plowshare, an effort to determine the feasibility of using controlled underground nuclear explosions to create massive craters that, if joined together could create harbors, canals, or open-pit mines.

A plan to use this process to dig a wide, sea-level "Pan-atomic canal" through the jungles and mountains of southern Panama to replace the existing Panama Canal and its "obsolescent" lock system was seriously considered (fig. 3). Under U.S. Department of Defense direction, scientists from the University of Puerto Rico-Mayagüez, Nuclear Research Center studied the effects of exposing tropical vegetation to "low levels of gamma radiation likely to be experienced in the aftermath of a controlled atomic explosion." Experiments were performed over a period of 90 days on selected trees and plants growing in a small plot located within the El Verde field station. At the time, the effects of the experiment were only evident at points very close to the radiation source; however, a tiny amount of residual radiation was recorded from a tree in the El Verde plot as recently as 1998.

Under U.S. Department of Defense direction, scientists from the University of Puerto Rico-Mayagüez, Nuclear Research Center studied the effects of exposing tropical vegetation to "low levels of gamma radiation likely to be experienced in the aftermath of a controlled atomic explosion."



Figure 3—Model drawing of canal construction using atomic explosions (Project Plowshare).

Project Plowshare was ultimately cancelled by the U.S. government owing to growing public concern about the potential for environmental contamination inherent in nuclear testing (Howe 2002)

The U.S. Navy at Pico del Este, 1963–2003

In the 1960s the U.S. Navy became interested in installing an electronic site on Pico del Este (East Peak) to support the activities of the newly-formed Atlantic Forces Weapons Training Facility (AFWTF) at Naval Station Roosevelt Roads in nearby Ceiba. In 1963, an interagency agreement between the Navy and the U.S. Department of Agriculture Forest Service was formulated that permitted the Navy to construct a 5-kilometer road from PR 191 through a portion of the dwarf forest to East Peak. The agreement also allowed for the subsequent installation and operation of a guided-missile operations control unit and a communications site at a point on East Peak that overlooked eastern Puerto Rico and the “Inner Target Range” on the offshore island of Vieques. Later in the 1960s, an AN FPS-67 surveillance radar was installed, and was operated as a joint surveillance system (JSS) with its radar data serving three separate agencies: The Federal Aviation Administration (as a flight-follow facility for San Juan approach control), the Drug



Figure 4—U.S. Navy Joint Surveillance System radar on East Peak.

Enforcement Administration (as an anti-drug-smuggling interdiction radar) and the U.S. Navy (to augment the AFWTF mission) (fig. 4).

Beginning in 1978, an additional mission that supported the new AFWTF Electronic Warfare Range began operation on East Peak. It consisted of radar threat platforms that provided Navy battle groups who were undergoing training exercises on the inner and outer ranges with simulated enemy electronic threat signals ranging from navigational radars to those of missile-guidance systems.

All radar, communications, and electronic systems on East Peak, with the single exception of the FPS-67 JSS facility, were shut down and removed when AFWTF and Naval Station Roosevelt Roads were deactivated by federal mandate in 2003. The Federal Aviation Administration will continue to operate the JSS radar on East Peak to provide flight-follow data to San Juan airport under the terms of a special use permit issued by the U.S. Department of Agriculture Forest Service (Global Security 2002).

U.S. Army Herbicide Research in the Luquillo Forest Reserve, 1963

In 1963, America's increasing involvement in the Vietnam war brought a second military research contract into the Luquillo forest. As part of an island-wide project directed by the U.S. Army Biological Laboratory and funded by the Advanced

All radar, communications, and electronic systems on East Peak, with the single exception of the FPS-67 JSS facility, were shut down and removed when AFWTF and Naval Station Roosevelt Roads were deactivated by federal mandate in 2003.

Research Projects Agency (ARPA) of the Department of Defense (DOD), a 0.4-hectare plot of native tropical vegetation in the Luquillo forest was used to test the defoliant effects of the chemical herbicide Picloram (4-amino-3,5,6-trichloropicolinic acid) also known as Agent White. This herbicide causes destructive proliferation of tissue in plants and trees when they are in a state of active growth. Experiments were performed by scientists from the U.S. Department of Agriculture (USDA) Federal Agricultural Experiment Station in Mayagüez; they were to determine if abnormally heavy (12.2 kilograms/hectare) application of this arboricide/defoliant would provide rapid clearing of forest foliage. If so, it could be employed as a means to deny cover and concealment to enemy soldiers in the tropical forests and jungles of Vietnam. From a military viewpoint the project was very successful; "The jungle growth in the Luquillo plot was largely killed." The potential for any long-term residual chemical effects caused by the heavy dispersal of Picloram in the plot (such as leaching of the chemical into ground water and/or threats to plant and animal species) were determined to be "non-existent" when tested with extremely sensitive instruments by the USDA.

From 1963 until 1971, U.S. Air Force "Operation Ranch Hand" C-123 spray aircraft dispersed 7.2 million liters of various herbicides on the jungles of Vietnam and Laos, 7.6 thousand liters were Picloram (Agent White), the same defoliant that was sprayed with such devastating results on the experimental plot in the Luquillo Forest Reserve in 1963.

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Parrots in Peril, Squirrels in Central Park: A Proposition for El Yunque Neotropical Bioserve Forest

Francisco Watlington, Ph.D.
Department of Geography
University of Puerto Rico

“La distinción artificial entre especies nativas y exóticas sólo busca burlar lo que debe ser una sabia política ambiental.” María de Lourdes Santiago, 2002

Some years ago, a bright-eyed, bushy-tailed young forester scampered to the top of Mount Britton and up the spiral stairway of the observation tower. An uncommonly clear day, he could see forever. Amazed at the panorama, he proclaimed: “*El Yunque is Puerto Rico’s Central Park!*” If so, one might ask: where are the squirrels? On a biogeographical time scale, the answer seems obvious. They are on the way, and will arrive sooner or later. Much sooner if the Forest Service decides to “think the unthinkable” (sensu Sedjo, n.d.): that the introduction of selected nonnative small mammal species to El Yunque would mitigate critical-link faunal disharmony and contribute decisively to the attainment of a viable population of Puerto Rican parrots (*Amazona vittata*).

It has transpired that the Puerto Rican Parrot Recovery Program is in dire straits mainly because the survival rate of aviary released birds is compromised by predation from an exceptionally dense population of guaraguao (red-tailed hawk: *Buteo jamaicensis*). The overabundance of hawks is likely sequent to encirclement of the forest by an urban ecotone offering a virtual buffet of domestic prey: chickens, pigeons, sundry pets including puppies and kittens, scavenging rats, mongooses, and no longer truly wild native doves, grackles, and other birds that have come to thrive on table scraps and the panhandled crumbs of human largess.

Aviary-reared native parrots are also semidomesticated, despite stringent measures to minimize human presence, ubiquitous on the outside. A recently released bird is said to have gone downtown, and at length returned to its free meal enclosure only to be taken by a hanger-on guaraguao. Albeit parrots are such social birds that their chatter and calling often attract their fellows—as well as their avian predators. Moreover, hawk avoidance is a skill difficult for caged parrots to acquire.

Why not provide an alternative prey for the hawks **within the forest**? An introduced Neotropical squirrel (*Sciurus*) would fill the bill if an appropriate species is

It has transpired that the Puerto Rican Parrot Recovery Program is in dire straits mainly because the survival rate of aviary released birds is compromised by predation from an exceptionally dense population of guaraguao (red-tailed hawk: *Buteo jamaicensis*).

selected from the diverse forms available in Central and South America. It would have to be diurnal, arboreal, and of course a strict vegetarian. An active, colorful beastie unafraid of people would be ideal as an educational and recreational asset as well. One such prospect is the Neotropical red squirrel (*Sciurus granatensis*), which has been well studied. According to Eisenberg and Redford (1999), “Most food items are large seeds [which they often cache] and fruits, but young leaves, mushrooms, bark and flowers are also taken.” Adults weigh from 1/2 to 1 pound, and occur at densities of up to four per hectare.

This means El Yunque’s roughly 5000 hectares of forest would have a carrying capacity to maintain a population of as many as 20,000 adult squirrels under predation, representing between 5 and 10 tons of potential standing biomass. An indepth study of guaraguao ecology should indicate how many raptors the prey population could sustain, provided that succulent squirrels are as desirable on their menu as plump parrots.

Although my proposal will surely raise the hackles of “hands-off” conservationists, wildlife officials averse to the introduction of exotic species may have to opt for shooting red-tailed hawks “on site” with unpredictable consequences. They might well heed Charles Elton’s (1958) admonishment:

I see no reason why the reconstruction of communities to make them rich and interesting and stable should not include a careful selection of exotic forms, especially as many of these are in any case going to arrive in due course and occupy some niche.

[With thanks to Ariel Lugo]

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Appendix 6: Congress Correspondence

27 de agosto de 2004

Ariel Lugo
Director
IITF, USDA-FS
Río Piedras, PR

Saludos Cordiales:

Primero le agradezco su invitación al “Tropical Forest Congress” celebrado en Caguas y Río Piedras. Le felicito a usted y su equipo de colaboradores por haber reunido a tantas personalidades y viejos amigos que de otra manera no veríamos.

Con relación a la discusión me pareció muy saludable pero los procedimientos fueron algo precipitados. Desafortunadamente nuestra portavoz no recogió el sentir del grupo y como decimos acá se fue por la ramas y abandonó el tronco. Por esto quiero hacer llegar, directamente, mis comentarios.

Los dividiré en dos categorías IITF y CNF.

IITF

Bueno

La biblioteca es un recurso único en el Caribe.

Llega al público general.

Accesible.

Malo

Investigaciones abstractas sin aplicabilidad al manejo de áreas.

Comunicación y relaciones con CNF

Mucho extranjero, pocos locales

Poco adiestramiento regional y local

Mejorar

Más investigadores locales

Más participación de estudiantes del país y del Caribe.

Cambiar

La actitud arrogante del más que sabe o más que manda o tal vez del conquistador sobre el colonizado.

Más investigación de restauración

CNF

Bueno

Ha protegido el bosque en términos netos.

Malo

Poco manejo, mucho mantenimiento.

Muchas relaciones públicas, poca sustancia.

No se consulta ni evalúan los permisos al público de manera efectiva.

No se compra terreno.

El personal “técnico” es pobre.

Atención nula a los vecinos del bosque.

La división de “law enforcement” es incompetente y disfuncional.

Los permisos se otorgan por períodos muy largos y no se inspeccionan con frecuencia.

El oeste del bosque está abandonado.

No tiene un vivero forestal y/o de plantas raras, amenazadas o en peligro de extinción.

El programa de la cotorra debe ser transferido al estado y localizado en áreas mas bajas y secas.

No hay conexión a la costa.

Mejorar

Veredas y rotulación.

Las relaciones estado-federal deben ser mejoradas mediante acuerdos de cooperación.

Revisar anualmente el plan de manejo con participación amplia.

Las relaciones con los residentes inmediatos.

Cambiar

El Yunque debe ser transferido al estado. La presencia del Forest Service debe ser mediante IITF y SPF. Muy parecido al modelo del Pacifico.

Adoptar el modelo de manejo comunitario en acuerdo con el estado.

En términos de los procesos me pareció imprudente que los empleados de carrera del FS fueran delegados con derecho a voto.

Propongo que un grupo de los delegados participantes sea parte integral de los procesos pos-congreso y participemos en la redacción de las resoluciones planteadas.

En general la actividad puede lograr cambios necesarios si hay la voluntad política y el reconocimiento de aspectos culturales y sociales que nos hacen diferentes.

Será un placer colaborar, como de costumbre, en esta y otras actividades futuras.

Muy atentamente;

Pedro J. Rivera Lugo

Message from Hilda Díaz-Soltero USDA Senior Invasive Species Coordinator

Thank you for the opportunity to participate in this event. I had to take a leadership role to manage the conversation and input into our team's product. Thus, I could not contribute some of the ideas to the Congress. Here they are for your paper and the consideration of the Forest Service.

1. The Forest Service (IITF) should protect the karst through land acquisition, manage it for water and biodiversity conservation, and conduct relevant research. This is the most vital water source in Puerto Rico.
2. I see the major roles of tropical forests in the 21st century as:
 - Pulmón verde del planeta (the “green” lungs of the planet)
 - Places to assist in slowing detrimental global climate change
 - Producers of clean, abundant water
 - Places to practice passive and active recreation
 - Ecological reservoirs for wilderness, roadless areas, research natural areas, and other best examples of remaining ecosystems.
 - Sites for demonstration projects for sustainable forestry resources use, resource management and restoration (e.g., water, food, wildlife, wood products, products for indigenous peoples' use and customs).
 - Research sites for basic and applied science, restoration, and sustainable uses of tropical forestry resources.
 - A major part of them set aside as protected areas to conserve biodiversity, ecosystem functions, and ecosystem services.
3. The wood production will occur primarily in private tropical forested lands, not in the protected areas. Thus, the Forest Service role will be to conduct the appropriate and relevant research and the knowledge and technology transfer so that private landowners can produce wood products sustainable and with no impact to other resources of ecosystem functions.
4. The lack of participation by the PSW and IPIF staff and Pacific stakeholders resulted in a focus on Caribbean and Neotropical forest recommendations at the Congress. That is a skewed view of what needs to be done by the Forest Service. I urge the Forest Service to conduct a second tropical Congress in the Pacific to obtain their input and recommendations for the agenda in that important part of tropical forests in the world. Jim Sedell should take the leadership role in organizing it.

Ariel, there were very strong feelings and ideas in my team related to the current military use of El Yunque. Here are the two main ideas expressed, which reflect the way Puerto Ricans feel about the issue and should NOT be ignored by the Forest Service:

1. Ban and do not authorize any military maneuvers or practices inside the boundaries of the Caribbean National Forest; neither inside the critical habitat of proposed, endangered, threatened, or sensitive species such as the Puerto Rican Parrot habitat.
2. Stop the “secret” activities decisionmaking, such as the previously described that never went through NEPA process nor were included in the current CNF resources management plan, was not shared with Forest Service employees, or impacted interested parties, communities, or the media.

Ariel, my team produced a lot of ideas that because of the time constraint, Elvira Cuevas, our reporter, could not present at the plenary. I urge you to ask her for the detailed notes that we took and she and I arranged at the end of the first session in an organized summary.¹ You will find a very rich tapestry of ideas for the Forest Service. Also, I left in your office the original notes that we took during the meeting with our Laurel Sabino Team. The input is there as well.² Again, thank you for the invitation and the opportunity to participate. Let me know if I can be of any further assistance.

¹ Per conversation with Elvira Cuevas on Dec 1, 2004, these notes were incorporated into the powerpoint presentation. The presentation may be viewed in: Group Reports; E. Laurel Sabino.

² The author refers to the notes taken on the flip chart. These may be viewed in: Group Reports; E. Laurel Sabino; Flip Chart.

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| <input type="checkbox"/> 007 | <input type="checkbox"/> 029 | <input type="checkbox"/> 051 | <input type="checkbox"/> 073 | <input type="checkbox"/> 094 | <input type="checkbox"/> 116 | <input type="checkbox"/> 138 |
| <input type="checkbox"/> 008 | <input type="checkbox"/> 030 | <input type="checkbox"/> 052 | <input type="checkbox"/> 074 | <input type="checkbox"/> 095 | <input type="checkbox"/> 117 | <input type="checkbox"/> 139 |
| <input type="checkbox"/> 009 | <input type="checkbox"/> 031 | <input type="checkbox"/> 053 | <input type="checkbox"/> 075 | <input type="checkbox"/> 096 | <input type="checkbox"/> 118 | <input type="checkbox"/> 140 |
| <input type="checkbox"/> 010 | <input type="checkbox"/> 032 | <input type="checkbox"/> 054 | <input type="checkbox"/> 076 | <input type="checkbox"/> 097 | <input type="checkbox"/> 119 | <input type="checkbox"/> 141 |
| <input type="checkbox"/> 011 | <input type="checkbox"/> 033 | <input type="checkbox"/> 055 | <input type="checkbox"/> 077 | <input type="checkbox"/> 098 | <input type="checkbox"/> 120 | <input type="checkbox"/> 142 |
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| <input type="checkbox"/> 014 | <input type="checkbox"/> 036 | <input type="checkbox"/> 058 | <input type="checkbox"/> 080 | <input type="checkbox"/> 101 | <input type="checkbox"/> 123 | <input type="checkbox"/> 145 |
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| <input type="checkbox"/> 017 | <input type="checkbox"/> 039 | <input type="checkbox"/> 061 | <input type="checkbox"/> 082 | <input type="checkbox"/> 104 | <input type="checkbox"/> 126 | <input type="checkbox"/> 148 |
| <input type="checkbox"/> 018 | <input type="checkbox"/> 040 | <input type="checkbox"/> 062 | <input type="checkbox"/> 083 | <input type="checkbox"/> 105 | <input type="checkbox"/> 127 | <input type="checkbox"/> 149 |
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| <input type="checkbox"/> 020 | <input type="checkbox"/> 042 | <input type="checkbox"/> 064 | <input type="checkbox"/> 085 | <input type="checkbox"/> 107 | <input type="checkbox"/> 129 | <input type="checkbox"/> 151 |
| <input type="checkbox"/> 021 | <input type="checkbox"/> 043 | <input type="checkbox"/> 065 | <input type="checkbox"/> 086 | <input type="checkbox"/> 108 | <input type="checkbox"/> 130 | |
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